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AND

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ERRATA.

Page 7, line 12, for "fitted," read "pitted."
 " 7, " 15 from bottom, for "snail," read "soil."
 " 8, " 22, for "**subtriata**," read "**substriata**."
 " 57, " 5, for "*Otiorrhinchus*," read "*Barynotus*."
 " 171, " 4 from bottom, for "*Typhœa*" read "*Typhœa*," and for "*norifer*," read "*nodifer*."
 " 214, " 5, for "*sylvestre*," read "*erectum*."
 " 217, " 5 from bottom, after "*rotundata*," insert "var. *alba*."
 " 217, " 2 " " " " "*Hyalinia*," insert "*nitidula*, var. *Helmii*."
 " 218, " 20 for "were," read "was."
 " 253, " 6 from bottom, after "lichenologist," insert "and Judge Borwick."

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The Irish Naturalist.

VOLUME VI.

THE LAND MOLLUSCA OF BALLYCASTLE AND DISTRICT, CO. ANTRIM.

BY ROBERT STANDEN.

(Read before the Conchological Society of Great Britain and Ireland,
10th December, 1896.)

EARLY in the month of September last I visited Ballycastle, Co. Antrim, in company with Dr. G. W. Chaster and Mr. J. Ray Hardy, and we were there joined by Mr. R. Welch, whose recommendation had induced us to choose this place as the scene of our investigations; and to his hearty co-operation and prior knowledge of the district we are indebted for no small portion of the success and pleasure attending our trip. The Antrim Arms Hotel was chosen as our headquarters, and I would strongly advise any naturalists, who may feel inclined to follow our footsteps, to put up at this comfortable old hostelry—which is just “home”—where they will find the genial host and hostess, Mr. and Mrs. Hunter, most kindly disposed to wink at the various “messes” inseparable from the cleaning and preliminary preservation of specimens, and other operations of the naturalist, which my brother-collectors must know the difficulty of carrying out at an ordinary hotel.

Our chief object was to obtain as full and complete a knowledge as possible of the molluscan fauna of the district, both marine and non-marine, and during our week's stay most of our time, when not engaged in marine work, was devoted to searching the surrounding country for land-shells. By using a car to convey us quickly to any desired point, and then working across country to another point where our car caught us up, we were enabled to get over a considerable extent of ground during a day, and, altogether, we worked about sixteen miles of the coastline and intervening ground pretty thoroughly. Our researches extended on the one hand over the magnificent promontory of

Fair Head, which marks the northern point of the Antrim coast ; and thence to the lovely wooded amphitheatre surrounding the Bay of Murlough, one of the most charming spots in the Kingdom ; and, on the other hand, to Whitepark Bay, the sand-dunes and cliff-talus of which we searched from Port Braddan to Ballintoy. The cliffs along the shore towards Sheep Island and Carrick-a-Rede ; the golf-links, sand-dunes, and riverside near Ballycastle, and delightful little glens on the right hand of the riverside road leading towards Glenshesk, and running therefrom into the high land, were all carefully examined, and yielded many good things. Wherever practicable, we made a point of bringing away bagsful of moss-shakings and rejectamenta, &c., for future examination at home, after drying and sieving. From the "pockets" of windblown shells on the dunes at Whitepark Bay we obtained a large quantity of exceptionally rich material. These "pockets" were found to contain an extraordinary accumulation of minute land-shells brought down by wind and rain from the herbage and bushes on the Chalk talus at foot of cliffs, or maybe washed over the cliffs from above. Most of the shells are "dead," and much worn by being blown to and fro amongst the sand, but many are in good condition, and some are alive—these probably live for a time upon the vegetable matter and plentiful supply of rabbits' droppings blown into the hollows along with them. It would require a vast amount of searching in the ordinary way to gain such an accurate knowledge of the molluscan fauna of a given locality as is afforded by the systematic investigation of material judiciously selected from such "pockets."

The geological features of the district are extremely diversified and replete with interest, but an adequate description is quite beyond the scope of this paper, and I must refer my readers to Prof. G. A. J. Cole's "Scenery and Geology of County Antrim," where the subject is most lucidly dealt with. I may, however, notice one or two salient characters of the coastline. The high basaltic cliffs are the most striking feature, but here and there they are replaced by fine Chalk cliffs, bounded, as at Whitepark and Murlough, by a sloping talus, the hummocky grassy slopes of which are formed by the Chalk having slipped in irregular masses over the soft Lias beds underneath.

This talus is the place *par excellence* for land-shells of many species, and the varied vegetation growing thereon adapts it especially to the requirements of molluscan life—particularly when, as at Murlough, it happens to be well wooded, for here we get many forms of slugs not met with in less sheltered and dryer situations.

The various streams and small lakes examined were remarkably barren, the only fluviatile mollusc found being a small form of *Limnaea truncatula* in a swampy place on Fair Head. Mr. R. Welch has, however, taken *Limnaea peregrina* and *L. palustris* in a ditch on Lemanagh Mountain, above White-park, in 1889; and *Ancylus fluviatilis* in Portaleen Glen, just south of Murlough, in 1893.

As regards previous conchological work in this district: although Thompson, the famous Irish naturalist, gives many records for Co. Antrim and North of Ireland generally, in his "Natural History of Ireland," vol. iv., and presumably includes Ballycastle, he only mentions the place specifically as a locality for *Helix virgata*. His remark "generally distributed" is often used, and usually refers to all Ireland. Probably he had so many Antrim records for any fairly common species that he confined his localities as far as possible to those counties where he had to depend upon the co-operation of correspondents and friends. Mr. R. Welch has collected about thirty species in the district on various visits during the past few years; and by his fortunate discovery of *Helix arbostorum* at Murlough in May last, has added another to the very few recorded stations for it in Ireland. He has also collected several species on Rathlin Island (which we had not time to visit), and I note these records in the list. Miss O'Connor, of Ballycastle, kindly showed us her collection of exotic shells, and embodied amongst them I noticed a few nice examples of the larger species of *Helices* common to the district, and collected by her in the neighbourhood.

The classification and nomenclature employed in the subjoined list is that given in "Irish Land and Freshwater Mollusca," by Dr. Scharff.¹

¹ *Irish Nat.*, vol. I., 1892.

(N.B.—Whenever "Glenshesk" is used to indicate locality of any particular species, it must be understood as referring to the little glen, already mentioned, on road leading from Ballycastle to Glenshesk proper).

Vitrina pellucida, Müller.—Good-sized dead specimens were fairly common at Murlough; and many small living ones in the "pockets" of windblown shells at Whitepark.

Hyallina cellaria, Müller.—Common at Murlough, and under stones on roadside going towards Glenshesk. Found at Ballintoy by Mr. Welch in 1889.

Hy. Draparnaudi, Beck.—At Murlough, along with many immature examples, we took a few exceptionally large specimens of this fine shell. Mr. Welch also got it there in 1894. Although not recorded for Antrim in Dr. Scharff's list, this species will probably be found more commonly as research extends. Large adult shells are, in my experience, not very plentiful, and the strong resemblance borne by the immature shell to *Hy. cellaria* will doubtless account for its being often overlooked by collectors unfamiliar with the differential characteristics of the two species.

Hy. allaria, Miller.—Common throughout the district; at Murlough, Glenshesk, and in the "pockets" at Whitepark, the type and greenish-white var. *viridula* are about equal in number. Some of our specimens from Murlough bear a strong likeness to *Hy. glaber*, but Mr. Thomas Rogers, to whom I have shown them, doubts their identity with that species. Rathlin Island (Welch, 1894).

Hy. nitidula, Drap.—Not uncommon at Murlough. One of my specimens has the last whorl pure white from the point where the second season's growth commences. One fine example of the white var. *Helmi* occurred on the wall of an old outbuilding near the path leading through the woods.

Hy. pura, Alder.—We found this species sparingly at Murlough, Glenshesk, and Whitepark, along with the brown var. *nitidosa*, Fér.

Hy. radiatula, Alder.—This, along with var. *viridescenti-alba*, is very common at Murlough, Glenshesk, and in the "pockets" at Whitepark. Mr. Welch took it at Torr Head, south of Murlough, and at Ballintoy, in 1889.

Hy. crystallina, Müller.—A few at Murlough, and plentifully in the "pockets" at Whitepark.

Hy. nitida, Müller.—A very thin and pretty form occurs in a damp spot at foot of some rocks near the footpath at Murlough.

Hy. fulva, Müller.—A few rather large ones amongst moss-shakings from Murlough and Glenshesk; common, but dead, in the Whitepark "pockets."

Arlon ater, L.—Common everywhere. Var. *brunnea* at Murlough. Thompson does not mention a northern locality for this slug.'

A. subfuscus, Drap.—Three specimens under logs at Murlough.

A. hortensis, Dr.—Two specimens at Murlough.

A. circumscriptus, Johnston.—One characteristic full-grown example at Murlough, feeding on fungus.

A. intermedius, Normand.—Several specimens under logs, and on a rotten tree-stump in a dark part of the wood at Murlough. One on fungus at Glenshesk.

Limax maximus, L.—Abundant, and very fine and well-marked, under some rotten timber at foot of a coppice on the roadside between Fair Head and Murlough. Some extremely large shells were obtained from these specimens.

L. marginatus, Müller.—Very plentiful on the trees in Murlough wood. Nearly all the tufts of *Orthotrichum phyllanthemum*, which grows so abundantly there, contained the "tree-slug" in all stages of growth, and its tracks could be seen high up on the tree-trunks.

Agriolimax agrestis, L.—This universally common slug was met with wherever we collected, but did not occur very plentifully, and little variation was noticed.

A. laevis, Müller.—This species is not given for Antrim in Dr. Scharff's list, but we found it rather common in damp parts of the woods at Murlough under moss-covered stones and old logs.

Helix pygmaea, Drap.—Two specimens from moss-shakings at Murlough, and a few dead in the "pockets" at Whitepark.

H. rotundata, Müller.—Murlough and Glenshesk, not very plentiful, but beautifully marked at the latter place, where the var. *Turtoni* also occurs. Obtained by Mr. Welch on Rathlin Island, and at Torr Head in 1889.

H. pulchella, Müller.—At Murlough the var. *costata* only occurs, but is not common. In the sandhill "pockets" at Whitepark it occurs dead in great profusion, along with a few alive; but on the crumbling face of the Chalk cliffs, and amongst the talus at the Ballintoy end of the bay, it is living in myriads. I have carefully gone over some thousands, sorted out from the material brought home from this place, and find very few examples of the ribbed variety—not more than five per cent. Thompson says "the ribbed variety is more common than the smooth (type) on the sea-banks." Dr. Scharff remarks that type and variety are generally found together, but this does not at all agree with my experience either in England, Scotland, or Ireland: indeed I have so often found the two forms living separate, and noted the absence of intermediate forms between type and variety, that I am strongly of opinion that the ribbed form—*Helix costata*, Müller—ought to rank specifically.

H. aculeata, Müller.—A few nice specimens obtained from moss-shakings from Murlough and Glenshesk; also dead in the Whitepark "pockets."

H. lamellata, Jeff.—This exquisite little shell appears to be generally distributed throughout the district, but we did not obtain more than eight or ten specimens from moss-shakings from any one locality.

H. hispida, L.—Very common, and variable in form. Var. *concinna* appears to predominate in the district. At Murlough a peculiar small dark flat form occurs—Jeffreys' var. *subrufa*. Along the walk on the cliff face, going towards Sheep Island, a large, thin, globose, pale form

occurs amongst the coarse grass growing in the clefts of the rocks. This is var. *subglobosa*, Jeff.

Helix rufescens, Penn.—Amongst a heap of stones on the roadside between Ballycastle and the harbour a large and distinct form was so abundant that it might be swept off the stones literally in handfuls. Scarce or absent elsewhere, being, as Thompson remarks, apparently replaced by *H. concinna*.

H. fusca, Mont.—Glenshesk: two specimens from moss-shakings. Mr. Welch took several specimens at Glenariff, to the south of the district, on his way to join us at Ballycastle on September 3rd, 1896.

H. arbustorum, L.—There is a small colony of this at Murlough, near the old limekilns, where it was discovered in May of the present year by Mr. Welch. The shells are large, and mostly typical, but a few are var. *marmorata*. This species occurs in so very few localities in Ireland that its discovery at Murlough is particularly interesting. Thompson records it for Larne, where he took many specimens. (See *Mag. of Zool. and Bot.*, vol. ii, p. 436). We brought away only a few specimens, and hope the colony will increase and multiply.

H. virgata, Da Costa.—On the sand-dunes by the Ballycastle golf-links there is an extensive colony of a small form of var. *submaritima*. Near the coastguard station at Ballintoy Mr. Welch took a few in 1894, and this year it is in profusion on a small bank by the roadside there, in company with *H. ericetorum*. He also took it on Rathlin Island in 1886, and at Whitepark in May last. Thompson specially mentions its Ballycastle station, and remarks on its erratic method of occurrence in one place, and then its absence for 100 miles or so.

H. ericetorum, Müller.—Extremely abundant at Whitepark Bay in company with *H. acuta*. After a damp night we found both species out in myriads feeding upon the rabbits' droppings, with which the scanty herbage of the sand hills is strewed. Var. *leucozona* and a white bandless form were equally common with the type, and some of the shells are unusually large.

H. acuta, Müller.—Abundant at Whitepark, where the principal varieties are *bizona*, *strigata*, *articulata*, and *flammulata*. Taken by Mr. Welch at Ballycastle in 1889; but we did not find it there this year.

H. nemorialis, Müller.—This beautiful species occurred nearly everywhere in suitable localities, exhibiting the usual forms of band-variation, and some of the less common colour-varieties: notably at Murlough, where we took some very fine red and yellow bandless shells, some of them extremely thin and fragile, but rather above the average size. With them were some pretty albolabiate and roseolabiate forms; also var. *castanea* and var. *olivacea*. At Whitepark the shells are more solid, well-coloured, and show considerable band-variation: the white-lipped form is not uncommon. On the roadside, just above the Ballycastle workhouse, we got some pretty varieties, including var. *undulata*. At Glenshesk some good examples of vars. *aurantia*, *rubella*, *coalita*, and *albolabiata* occurred. In fact the district is in no way behind other places in its show of varietal forms of this attractive species.

H. aspersa, Müller.—The constancy of marking exhibited by this species throughout Ireland has often been noted, and the vast number of specimens observed in our district were, generally, no exception to the rule. At Whitepark nothing approaching any particular "variety" was noticed amongst the thousands we saw. At Murlough a little less uniformity occurred, and one good typical var. *undulata* was taken, along with a form approaching *grisea*, on rocks near the footpath. A very dark and almost unicolorous specimen was found in Miss O'Connor's greenhouse. Otherwise the shells everywhere looked much alike, and their good and unweathered condition was remarkable, considering the exposed places in which many were living. The Chalk cliffs at Whitepark presented a wonderful spectacle. In many parts they are fitted with regularly-shaped holes of different sizes, and in every hole rested a *H. aspersa*, the dark shell showing up conspicuously against the white background. On one little bluff, about 4 yards by 2, we counted over 200 specimens—and this did not include those far down in the crevices.

The first impression was that the shells are resting in natural cavities caused by the weathering out of flint nodules or fossils, but a more critical examination shows all the holes to be fairly symmetrical: they are not anything like as irregular as flint-cavities, and, besides, there are no flints there. So far as I can ascertain there are no holes like these elsewhere in the county. Almost all the holes run up vertically, a few nearly so, none down, and most of them are underneath the little ledges left in the face of the cliff by weathering. Dr. Scharff alludes to this habit of *H. aspersa* in *Irish Naturalist*, vol. 1, p. 118, and quotes M. Bouchard-Chantereaux's experiments, which point to the presence of an acid secretion in the animals which might have an influence in softening the hard chalk, and thus enabling the snail with its rasp-like tongue to remove the material. This is very probable, but from my own observations on some aspersas in captivity⁽¹⁾, which ate enormous quantities of chalk—so much so, that the pot in which they were confined was strewed with their excreta in the form of white pellets, covering the snail to a considerable depth—I should say that the gradual gnawing away of the soft weathered chalk of the Whitepark cliffs by successive generations of aspersas would very well account for the remarkable holes tenanted by the shells there. The diameter of many holes is larger inside, and there is a general look of freshness immediately underneath the animals, which seems to point very conclusively to the holes being their own work.

Cochlicopa lubrica, Müller.—In the Whitepark "pockets" thousands occur—living and dead together—and it is fairly plentiful everywhere, together with its varieties *ovata* and *lubricoides*. Var. *hyalina* occurred at Murlough and Glenshesk, Rathlin Island, and Ballintoy, 1889 (Welch).

Pupa angularis, Fér.—A few very dark-coloured specimens at Murlough; some nice examples of var. *pallida* at Glenshesk, and a few dead in "pockets," Whitepark.

⁽¹⁾ *Journ. of Conch.*, vol. vii., p. 33.

Pupa cylindracea, Da Costa.—Common at Murlough, along with var. *curta*; fairly plentiful elsewhere; at Glenshesk an elongated pellucid form occurs sparingly.

P. muscorum, Müller.—Abundant in the "pockets" at Whitepark, some alive. We here got two fresh dead and three living specimens of var. *albina*.

Vertigo edentula, Drap.—Amongst moss-shakings from Murlough and Glenshesk we obtained a good many specimens, most of them immature; also a few fresh ones in the Whitepark "pockets."

V. alpestris, Alder.—The occurrence of this rare alpine species in the "pockets" at Whitepark is especially noteworthy. Several dead and two living specimens were taken. One example was picked up on the spot, and we were much interested in watching its active movements in the tube, to which it was carefully transferred from Mr. Welch's muslin sieve. Dr. Scharff says in his Irish list (1892) that the occurrence of this species practically rests on the record of a single specimen taken at Coleraine, and at time of writing he had not seen an Irish specimen. Since then, however, I have taken it at Portsalon, Co. Donegal, and sent a specimen to Dr. Scharff.

V. pygmæa, Drap.—Common at Whitepark, dead; and a few living ones from moss-shakings from Murlough, and Glenshesk.

V. subtrilata, Jeff.—Some pretty live shells amongst moss-shakings from Glenshesk and Murlough. Many dead in Whitepark "pockets."

V. antivertigo, Drap.—Five living specimens in a damp part of Murlough wood, amongst leaves and wet debris.

V. pusilla, Müller.—Another interesting and rare shell yielded by the examination of the "pockets" at Whitepark, which have proved a veritable treasure-house for the Vertigines. Both dead and living specimens occurred, and we have no doubt the species is living in abundance amongst the talus at foot of the cliffs, where we should recommend careful search by future collectors in this conchological paradise.

V. angustior, Jeff.—Very abundant in the Whitepark "pockets." The extreme freshness of the majority of the shells indicates that it is living near at hand, but although we searched long and carefully, in the brambles and bracken ferns which grow densely in damp low-lying places between the sand-hills, we were unsuccessful.

Balea perversa, L.—Abundant on the old trees in Murlough wood, and in the tufts of moss—*Orthotrichum*—growing luxuriantly on the trees.

Clausilia bidentata, Strom.—Common throughout the district, and somewhat variable. At Murlough the form approaches var. *tumidula*, and here, as elsewhere, some of the shells are covered with a dense conervoid growth, but this seems not to interfere with the epidermis of the shells, which is found quite intact, and richly marked, when the green growth is cleaned off.

Succinea putris, L.—A small pale form in a damp part near the brook in Murlough wood.

Carychium minimum, Müll.—Common at Murlough, and a few taken at Glenshesk and Whitepark.

Acme lineata, Drap.—Found in moss-shakings in a damp corner amongst the rocks on way from Fair Head to Murlough. One living specimen was found in a tuft of *Orthotrichum* taken from a tree in Murlough wood. This is, in my experience, a singular and unusual habitat for the species, but I have long had an opinion that the species might at certain seasons become somewhat arboreal in its habits. It would be interesting to look out for this where *Acme* is known to live in woods containing mossy trees.

FIELD CLUB NEWS.

We have pleasure in drawing attention to the action of the Committee of the Dublin Club in opening a subscription list on behalf of the Giants' Causeway Defence Fund. It would certainly be discreditable if the gentlemen who are contesting the case on behalf of the public—one of whom is the President of our premier Field Club—did not meet with ready support from all those who would like to see the Giants' Causeway open to all students of nature in the future, as it has been in the past. The Dublin Club's subscription-sheet will be on the table at the next two meetings, and contributions will be received at any time by the Treasurer, Prof. T. Johnson, 12 Gilford Avenue, Sandymount. While on this subject we may mention the admirable lecture delivered by Mr. William Gray to the Belfast Club on November 17, on "The Origin and present Condition of the Giants' Causeway," which will no doubt stir up local interest in the matter.

The Committee of the Dublin Field Club have accepted the invitation of their brethren in Belfast to join them in a three-day excursion next July to the beautiful North Antrim coast. Ballycastle will be the base of operations, and from there the combined Clubs will penetrate to the recesses of Murlough and White Park and Glenshesk. It is hoped that members of the Cork and Limerick Clubs will also take this opportunity of visiting one of the most beautiful and interesting districts in Ireland.

Our warm congratulations to three members of the Dublin Club—Prof. A. C. Haddon, on whom the degree of D.Sc. was conferred at Cambridge last month, Mr. A. H. Foord, who has taken the Ph.D. of Munich, and Mr. H. L. Jameson, who has just obtained his B.A. degree in Natural Science at Dublin University, with first class honours and a gold medal.

Some changes are announced in the official staff of the Dublin Club for 1897. Mr. N. Colgan, Vice-President, retires, owing to pressure of work in connection with the new edition of *Cybele Hibernica*. His place is filled by Mr. R. Lloyd Praeger, whom Prof. T. Johnson succeeds as Secretary, while Prof. Johnson's post as Treasurer is filled by Mr. H. K. Gore Cuthbert.

THE MIGRATION OF BIRDS.

ABSTRACT OF THE BRITISH ASSOCIATION COMMITTEE'S REPORT.

BY J. E. PALMER.

THE British Association Committee appointed to enquire into the subject of the Migration of Birds, after recording the observations made by the lighthouse and lightship keepers around our coasts for eight years, has now systematised and tabulated these observations in such a way as to give clear and good results. The labour has been enormous, for it was necessary to schedule more than one hundred thousand distinct observations in five different ways. This task was undertaken by Mr. W. Eagle Clarke, to whom the other members of the Committee express their deep sense of obligation. The Committee also express their indebtedness to the lighthouse authorities, and especially to the lightkeepers, whose intelligent co-operation made the work possible. As it is nearly twenty years since the Committee was first appointed, its *personnel* has undergone some change. It now consists of Professor Newton (Chairman), Mr. Jno. Cordeaux (Secretary), Mr. J. A. Harvie-Brown, Mr. R. M. Barrington, Mr. W. E. Clarke, and Rev. E. P. Knubley. The first four were original members of the Committee, as was the late Mr. A. G. More. As the Report is a long one it is necessary to omit here many details and minor points of interest. I purpose giving its substance, omitting no fact or deduction of importance, and keeping to the language of the Report as far as is consistent with sufficient condensation. It is perhaps more convenient to explain that the wording of the Report is largely used than to overcrowd the pages with quotation marks.

The Report states that the object of the enquiry was to obtain full and reliable data as to the migratory movements of birds observed on the coasts of the British Isles; and that there is now established, as regards Great Britain and Ireland, a firm basis for a sound conception of many of the phenomena of bird-migration, for it contains a plain statement of ascertained facts, and is free from theory or speculation. Much however yet remains to be learned from the observations collected; and the subject of inland migration is still un-

touched. The records on which the Report is based were made from 1880 to 1887.

The vast array of facts collected was arranged in a schedule showing for each species during each month (1) on what day, (2) coast, (3) station, (4) in what numbers, and (5) whether the occurrence was during the day or night. The results given are based on the whole of the information received from all the coasts. It is found to be impossible, at certain seasons, to distinguish between widely different *Immigratory* and *Emigratory* movements without consideration of the whole of the observations; the non-realisation of which fact has hitherto lead to misconception.

It is manifestly impossible to conduct anything approaching a really complete enquiry over the entire British area. Remembering the peculiar difficulties besetting such an investigation, the nature of the data obtained is satisfactory, and has proved surprisingly accurate and adequate for the purpose. It is often astonishing how observations made at one station are borne out by the records at others.

As to the importance of the enquiry, such a voluminous set of observations, made from the most favourable situations for witnessing bird-migration, has never before been amassed. The special nature of the work can only be fully appreciated when it is realised that in order to study the phenomena of bird-migration in the British Isles, the data on which deductions may be satisfactorily founded must be based upon observations taken synchronously at stations around the entire coasts. This cardinal condition has been accomplished for the first time in any country through the labours of the Committee. The results given are based absolutely upon the records obtained by the Committee, and the subject has been approached without preconceived ideas. The Daily Weather Reports of the Meteorological Office have been consulted and correlated with the data relating to the migratory movements.

Bird-migration, as observed in the British Isles, is perhaps more complex than in other regions, for our isles, lying between south-western Europe and the Scandinavian peninsula, Iceland, and Greenland, are directly in the course taken by legions of birds which annually make a double journey between their northern summer homes and their southern winter

quarters. Our shores form a main highway and convenient resting-places for these migrants. Our islands have a vast bird population of their own, and the majority of these birds belong to migratory species. Many species which are migratory are only partially so in our islands. Our variable climate causes much internal migration within Great Britain, and with Ireland. This occurs in winter. Migrations of a varied nature thus occurring, often through a combination of meteorological conditions, two or more distinct migratory movements are sometimes observed in progress simultaneously.

Although in passing from summer to winter haunts birds go from a northern to a more southerly clime, it does not follow that these haunts are reached by a simple movement from north to south. This is especially the case in Western Europe, where, with its irregular coast-line, more or less devious routes are followed. The situation of the British Isles is an important factor in this deviation. The distribution of birds on our coasts during migration, and the routes traversed, naturally depend on the nature of the particular movement. The principal movements are the intermigrations between our islands and the Continent.

Between Britain and the Continent pass hosts of migrants, which are either birds of passage on, or winter visitors to, our shores. The former visit our east coast in spring when passing to their northern summer haunts to the north-east of Britain, and again in autumn when going to their winter haunts in the south. The winter visitors are chiefly individuals from the ranks of migratory species which spend the winter in the British area, and go to the north-east of Europe for the summer. In autumn these numerous migrants arrive from the north-east on the eastern shores of Britain, from the Shetland Isles to the northern coast of Norfolk. During these movements the more southern portion of the east coast of England is reached after the arrival of the birds on the more northern portion. It is noteworthy that all the British birds of passage to northern Europe are either summer visitors to Scandinavia, or are regular migrants along the western shores of that peninsula; and that they all occur during migration in the Orkney and Shetland Isles, but not

in the Faröes. After arriving on our east coast these immigrants—some of them after resting for a while—move either down the coast *en route* for more southern winter quarters or to their accustomed haunts in the British Isles. The west coast do not receive directly any immigrants from Continental Europe.

An East and West Migration Route is one of the discoveries of the enquiry. During autumn a stream of migrants, largely composed of certain species, passing from south-east to north-west, and from east to west, is observed at the lighthouses and lightships along the southern section of the east coast (from Kent to the Wash). This is called the "East and West Route." At the more northerly stations of this section of coast the birds are going from south-east to north-west, and at the southerly stations the direction is from east to west. Of those going north-west some go beyond the Tees, many proceeding inland as they go. Some of the birds following this east and west route pass to the west along southern England. Immigrations from the Continent by this route are renewed during winter when there is severe cold.

Some remarkable features associated with these east to west movements are :—(1) they are frequently observed for a number of consecutive days; (2) they often occur when there is an absence of migration on other parts of the coast; (3) the movements appear to be confined to the daytime, and are usually timed as from soon after daylight to 1 p.m.; (4) the flocks are chiefly composed of Larks, Rooks, and Hooded Crows, while Redbreasts, Goldcrests, Chaffinches, Greenfinches, Tree-Sparrows, and Starlings are numerous; there are Woodcocks occasionally, and during the winter Larks, Thrushes, and Lapwings; and (5) on some occasions these birds while passing northwards along the English east coast actually cross the migrants which are proceeding southwards. Whether this east to west stream is a branch of one that passes down the coast of Continental Europe, or whether it originates in central Europe, is not ascertained.

The conclusions relating to these migration-routes are chiefly based on the autumn data, which are more voluminous and complete than the spring records. The spring records however show that the birds retrace their flight along the

lines taken in autumn. Records of the bird movements observed at Heligoland from 1883 to 1886 by Herr Gätke have been compared with the records of Eastern Britain for the same period, but they do not bear out the supposition of a direct migratory movement between Heligoland and Britain ; which places thus appear to draw their migratory hosts from different sources. Some species which make the Faröes, Iceland, and Greenland their summer homes (the Wheatear, White Wagtail, Whimbrel, &c.) are observed on passage on the western coast of Great Britain and on the Irish coasts. This movement is independent of the great stream of migrants arriving at and departing from the east coast of England in autumn and spring.

The emigratory movements on the east coast are simple : when the coast is reached the birds follow it southwards, and quit our shores on the south of England. The movements down the west coast are less simple : the route followed is only partly by the coast, the coastline not forming a direct route. At various points the flights receive large accessions. In connection with these movements the coasts of Cumberland and Lancashire lie outside the route taken ; the north-east coast of Ireland is only occasionally touched ; the contributory flights from Ireland are almost entirely from the southern, and particularly the south-eastern, coasts. The south-western coast of England seems to be especially affected when there are considerable movements on the south and south-east coasts of Ireland, implying that there is much intermigration between these particular portions of the English and Irish coasts.

The Irish records have been excellently kept, and the returns of specimens killed against the lighthouse and lightship lanterns around the Irish coasts have been larger and more valuable than those received from the coasts of Great Britain. The Irish coasts do not in themselves constitute a main highway for birds, but they participate along with the western shores of Great Britain in movements on the part of some birds. Probably many of the birds observed on the Irish coasts are migratory members of the Irish avifauna.

When the movements from the south-east Irish coast, already referred to, are occurring, there is often a movemen

along the western coast from Slyne Head southwards. These Irish emigrations usually occur simultaneously with similar movements passing down the western coast of Great Britain, and the two streams of migrants meet and unite between the Bristol Channel and the Scilly Islands. Some of the Irish autumnal flights, however, are independent of these general movements.

The observations collected show that not only do the autumnal emigrants depart from the south-east coast of Ireland, but also that many migrants (e.g. Thrushes, Redwings, Black-birds, Chaffinches, Greenfinches, Linnets, Starlings, Larks), almost simultaneously arrive, by the same route, in Ireland, in order to winter there. These cross-channel flights are usually observed in the daytime, but at times some of these birds reach Ireland in the night.

Independently of these main Irish migratory movements, Thrushes, Larks, and Starlings occur in October and November on the northern coasts of Ireland as immigrants from Scotland. Larks are recorded by this route in the daytime. There are also east and west autumnal movements between Ireland and Great Britain on the part of Starlings, Chaffinches, Greenfinches, Larks, and sometimes various species of Thrushes. Anglesea is the chief Welsh point, and Rockabill, County Dublin, the chief Irish station, where these departures and arrivals are observed. The migratory movements noted on the west coast of Ireland are neither many nor important, and consist chiefly of movements on the part of emigratory Irish birds. There are, however, remarkable immigrations from home sources witnessed on the west coast and its islands during great cold or snow.

The records from the south coast of England are not as complete as from the other coast lines ; but they point to a considerable migration taking place between this coast and the south-west of Europe, and to important movements taking place along the entire line of coast. It is possible that British emigrants, after passing down the east coast of England, may turn to the westward and skirt the south coast ; but this is not shown with certainty. The continental immigrants strike the Kentish shore, and, as already stated, some pass up the east coast, while others go west, probably

to Ireland, on whose south-eastern shores the birds are recorded, almost simultaneously, as arriving from the south-east. Some of these birds, Skylarks especially, seem to go northwards towards the Outer Hebrides, being observed at a number of stations on the route thither.

The first autumnal movements begin towards the end of July on the part of species which nest in the far north, such as the Whimbrel, Knot, Green Sandpiper, Curlew Sandpiper, Turnstone, and Bar-tailed Godwit. Probably these July immigrants may be non-breeding birds. The immigration during August includes twenty-six species whose summer homes are beyond the British area, and the northern representatives of several British breeding species. September shows a marked increase in immigration both as regards species and individuals. Over forty species which do not spend the summer in Britain are recorded as migrants this month.

In October the flood of immigrants reaches its greatest height, when prodigious numbers of birds arrive; but certain species appear to have ceased to occur, having already passed. After the middle of November immigration of birds which spend the summer in the north ceases, with the exception of marine species (Ducks, Gulls, Grebes, Swans) whose movements depend on severe weather. A few other species are recorded more numerously during November than earlier, namely, the Lapland Bunting, Ring Dove, Little Auk, and the winter Grebes. The immigrants arriving by the East and West Route come from September to November, and again during the winter when severe cold occurs.

The emigration of our summer visitors begins towards the end of July, when Cuckoos and Swifts commence to go. About the same time small numbers of other species begin to move. It should be borne in mind in connection with this July movement that at this time many young birds, whose parents are busy with second families, are outcasts, and wander about until they reach the coasts, where they have been recorded. Some of the Plovers and Sandpipers also appear at the coast accompanied by their young at this time. During August much emigration among our summer visitors occurs, thirty-three species being recorded as departing. Thirty-four species which are partially migratory are recorded as emigratory in

August, though perhaps all are not necessarily passing beyond the British area. Both these classes of emigrants probably are increased in numbers by birds of the same species which pass the summer further north than the British Isles, and which, having reached our shores as immigrants, are also moving southwards along our coast line.

September witnesses the height and the close of the emigration of the bulk of the smaller British summer visitors. Over forty of these are recorded as moving off in this month, and about the same number of partial migrants. There are often tremendous rushes of migratory birds towards milder climates in this month, due to outbursts of ungenial weather. The partial migrants are much on the move in October. Emigratory birds are observed passing southwards, and feeding as they go, during the daytime; but their oversea flights are usually undertaken at night.

After the middle of November, and through the winter during cold spells, movements of a different nature take place, due to severe weather. Birds specially affected then go either to warmer districts within the British Isles, or to more southern regions. When frost sets in, particularly if there is snow and sleet, it causes an immediate rush to the coast, and especially to the western coast of Ireland, where a milder climate almost always prevails, even when there is very cold weather in other parts of the British Isles. If the cold is severe and prolonged, the isles off the south-west coast of England and Ireland are sought. Occasionally, as in December, 1882, these usually safe retreats failed the refugees; the hardy Snow Bunting perishing with the rest. The species which appear especially susceptible to cold, either constitutionally or from deprivation of food (most probably the latter), are the Missel Thrush, Song Thrush, Redwing, Fieldfare, Blackbird, Greenfinch, Linnet, Starling, Lark, Water Rail, Lapwing, Curlew, Snipe, and Woodcock. Cold weather migration is performed in both the day and night time, the more extended flights appearing to be taken in the night.

The earliest spring migrants are recorded in February, when such partial migrants as the Pied Wagtail and Lapwing return to the Orkneys and other northern stations, and certain rock-breeding seabirds revisit their nesting haunts.

There is also a return movement of Thrushes in mild weather. In March there is a considerable return of partial migrants, and of a few summer birds; but in April the latter mostly return.

It is remarkable, in connection with the arrival of these earliest immigrants, that the great majority of them are recorded first at the south-west coasts of England and Ireland. Thus in March, out of 94 observations, 71, or 75 per cent., were made in the south-west. In April, out of 157 first records of the arrivals of summer visitors, 115, or nearly 74 per cent., are recorded from the south-west coast and Ireland. These percentages should be higher, for it must be explained that there were no spring data for Ireland in 1880 and 1881, nor for the west of England in 1883, while the east coast has been credited, in the statistics quoted, with the observations made during all the years of the enquiry. It thus appears that spring migrants, not unnaturally, appear first in the warmest parts of our islands.

In May the immigration of summer birds continues. There are arrivals of Wheatears, Warblers, Swallows, Sandpipers, and Plovers up to the end of the month. These are undoubtedly on their way to summer homes further north than the British Isles, for our own birds of the same species are then busy with nesting operations. During June, especially in the first half of the month, several species whose breeding range extends to the Polar regions appear in considerable numbers on our shores. The chief among these are the Grey Plover and Knot; less numerous are the Snow Bunting, Wigeon, Barnacle Goose, Grey Geese, Swans, the Dotterel, Turnstone, Sanderling, Ruff, Bar-tailed Godwit, Whimbrel, and a few Great Northern Divers.

In connection with the spring immigration, the observations favour the theory that the earliest arrivals are British-breeding birds. This is borne out by the well-known fact that our summer birds appear in their breeding-haunts in our islands immediately after their first appearance on our coasts. Further corroboration is found in the fact that summer birds arrive in Britain earlier than in Heligoland, where nearly all the species observed are *en route* for more northern lands than ours.

The spring emigration from Great Britain to the Continent begins early. In February, in some seasons, Geese begin to move northwards, but the chief emigratory movement is the departure of Larks and Rooks to the Continent by the East and West Route. During March these movements increase, when the Hooded Crow is also seen returning to the Continent. Emigration to the north also commences on the part of the Great Grey Shrike, Shore Lark, Swans, Geese, Gadwall, Scaup, Golden Eye, Long-tailed Duck, Red-throated Diver, and probably many others. In this month, too, the Greenfinch, Chaffinch, Twite, &c., leave their winter retreats on the west coast of Ireland. In April thirty-four species are observed to leave our shores for the north, and the emigration by the East and West Route comes to an end.

In May the emigration to the northern breeding-grounds reaches its maximum, when fifty-three species are recorded. Our emigrants from Britain are joined by others (some of the same species as those leaving us) which have wintered further south. The departure of our winter visitors and the spring birds of passage takes place from the eastern coasts of Britain and the northern isles. A few species only, such as the Redwing, Wheatear, White Wagtail, Barnacle Goose, Swans, and Whimbrel pass up our western coasts, possibly *en route* for Iceland.

Special attention has been given to the actual relation between migrational and meteorological phenomena. The data relating to the latter are taken from the "Daily Weather Reports" issued by the Meteorological Office. These reports are based on observations made at fifty-four stations distributed over Western Europe. It was necessary thus to consult the Continental as well as British weather-conditions, for it is essential that the weather prevailing where the migratory movements have their origin should be considered. An extensive series of comparisons between the two sets of phenomena shows that they are intimately associated.

It is found that in both the spring and autumn migratory periods there are spells of genial weather without marked features other than those favourable to migration. During these the migratory movements are of an even-flowing nature. If the weather proves slightly unsettled during such periods

it is a matter of indifference to the migrants ; but if more pronouncedly so, their movements are slightly quickened thereby. The duration of such favourable spells is sooner or later broken by the advent of a cyclonic period, which interferes, to a greater or lesser degree, with the progress of migratory movements. Unfavourable weather-conditions of a pronounced nature temporarily interrupt the ordinary movements. The weather incentives to migration are of different kinds. First, there may be favourable weather-periods immediately following unfavourable periods. Secondly, they may be due to unfavourable weather, such as lower temperature, which either compels the birds to move, or acts as a warning to them to do so. Thirdly, and on the other hand, genial spring weather is an incentive to a northward move. Temperature plays the most important part in the various seasonal movements.

All the great autumnal immigrations coincide with favourable weather-conditions in north-western Europe—namely, the presence of a large well-defined anticyclone over Scandinavia, with gentle gradients to the south-west. On the other hand, cyclonic conditions may prevail west of the British area, with a low pressure centre off the west of Ireland. Under these conditions the weather is clear and cold, with light variable airs, over Norway and Sweden ; while in Britain the sky is overcast, with easterly winds, and frequently with fog on the east coast. These conditions usually follow the passing away of a cyclonic spell from Scandinavia, during which ordinary migratory movements are interrupted. Movements from the east by the East and West Route are most pronounced during similar favourable weather-conditions. All the autumn movements are stimulated by a fall in the temperature. In connection with spring immigration several unusually early appearances have been recorded, and the daily weather report shows that the localities where these early occurrences took place were at the time the warmest spots in Western Europe.

A careful comparison made between the migrational and meteorological phenomena in connection with these movements from the Continent shows that all such movements, except those performed late in the season, are to be correlated

with a rise of temperature in south-west Europe, which evidently induces the birds to start northwards. In not a few instances such movements are recorded for dates on which the temperature in Britain was lower than immediately before the immigration. This indicates that the increase of warmth at the seat of emigration is the main factor influencing the northward spring movement. This rise of temperature sometimes extends over the British Isles. Apart from this simple phenomenon no other peculiar meteorological condition appears to be associated with these spring movements. The spring migration from our islands to northern breeding-grounds is influenced by the weather-conditions prevailing at the time in the British area. This emigration, however, naturally takes place later than the corresponding movement into Britain from the south : it appears to commence in April and continues during May. It is embarked upon under the same type of pressure-distribution as that which is favourable to the autumn migration, namely, a high pressure centre over Norway and Sweden, with gentle gradients to the south-west. Under these circumstances there is fine weather over the North Sea.

The anticyclonic, or fine-weather periods in April are favourable to migration if the temperature is fairly high. Cyclonic periods as a rule are unfavourable owing to their high winds and ungeniality; on the other hand, when they are mild and follow a cold spell they are favourable to a northward migration from Britain. In autumn marine species, such as Skuas, Petrels, Phalaropes, &c., are occasionally driven out of their course by gales, when they appear on our coasts in large numbers, and are sometimes driven inland.

A careful study of the subject shows that the direction of the wind has no influence as an incentive to migration, but that its force is an important factor. The birds do not appear to be concerned by ordinary winds, but they do not migrate when the winds are exceptionally high. Particular winds usually prevail during the great autumnal movements. These, although favourable, are not an incentive to migration, but are the winds that accompany the high pressure centre over Norway, already referred to.

PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent donations comprise a Great Cyclodus from the proprietor of the *Irish Field*; a Sparrow-hawk from Mr. W. Russell; a number of Irish birds from Rev. T. B. Gibson; a Diamond Snake from Miss E. Fitzgibbon; a Black Tortoise from Mr. A. E. Jamrach; a Kestrel from Mr. K. M. Dunlop; a Nubian Goat from Master Moloney; a pair of Rabbits from Miss J. Bailey; a Stoat from Mr. W. W. Despard; a number of fish from Mr. J. Golden. A Somali Lioness, a Golden Cat, a pair of Wood Storks, a pair of Snow Geese, a Boa Constrictor, three African and three Indian Pythons, six Egyptian Snakes, four Monitors, and eight large Tortoises have been acquired by purchase.

3,940 persons visited the Gardens during November.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

DECEMBER 1.—The President (Professor EVERETT) presided.

Mr. ALEXANDER TATE first submitted his report of some matters considered at the Brit. Assoc. meeting in Liverpool. He asked the special attention of the Society to two schemes affecting the working of Societies like theirs which were discussed at considerable length at those meetings. The object of the first of those schemes was to promote the formation of district unions of natural history societies. It was drawn up and submitted by Mr. George Abbott, general secretary of the South-Eastern Union of Scientific Societies, and it proposed the division of the United Kingdom into fifteen or twenty districts, in each of which the societies should be grouped together for mutual aid, counsel, and work, any existing unions to be taken advantage of and not disturbed, each union to have an annual congress, held year by year in different towns, and to be attended by delegates and members from the affiliated societies. A further suggestion was that each local society should have a corresponding member in each village in its district to look after its interests and forward in every way its objects. The working of the Yorkshire Naturalists' Union had been very successful, one important result being the training of a number of skilful workers in the various departments of natural science. What had been done in regard to the Irish Union of Natural History Societies was clearly stated by Professor Johnson, the delegate from Dublin Naturalists' Field Club, and was corroborated by himself (Mr. Tate). The second proposal was made by Professor Petrie, its object being to provide a federal staff for local museums. He alleged that the main difficulty in the management of local museums was the securing of sufficient work for and means of paying for services of highly-trained and competent men as curators, and he considered that this would be obviated if there was co-operation. The opinion of speakers who took part in the discussion was generally favourable to the scheme. It appeared that a somewhat similar idea had been mooted some years previously, and had been reported on by a sub-committee of the Museums Association, without, however, leading to any definite

result. A strong protest was made by Professor Johnson, of Dublin, against the suggestion that the curators of the local museums should be converted into mere caretakers; he referred in terms of high commendation to the abilities of a curator in the North of Ireland, but expressed his surprise that his services were not adequately remunerated.

Dr. J. LINDSAY, M.A., read an essay on the poet Dante.

Mr. W. H. PATTERSON, M.R.I.A., then read an account of a recent discovery of worked flints in submerged peat at Portrush. He explained that the West Bay at Portrush had long been known as the site of an exposure of submerged peat. The winter storms of the last two years had, by washing away great quantities of sand, caused a much larger section of peat to be visible. The thickest masses of peat were at high-water mark, in one place forming a perpendicular face of nearly six feet high. In other places the peat showed an exposed face of three or four feet, and from that down to one foot or less, according to the extent to which the sea carried away the shelving sand which sloped from the peat down to the sea. There was also a good exposure of the peat and numerous remains of large trees between tide-marks. Here one walked on the top of the deposited beds, which were probably thinned away by marine denudation. The beds of compact peat higher up on the beach, and which present faces of various heights, as referred to before, were overlaid by banks of sand from fifteen to twenty feet high, and with vegetation on their surface. The sand was fine, and seemed to be chiefly blown, but in some places a slight stratification showing pebbles was noticed. This sand had been deposited over the peat, but was now being removed by the action of the winds and waves. The peat was exceedingly compact, but contained sand, showing that it was formed within the influence of winds carrying sand, doubtless from some sea-strand. The peat could not possibly have been formed at its present level as regards sea; the land here had probably experienced a downthrow, or possibly alternations of level had taken place, and thus the sea had been enabled to encroach very considerably upon the land. The remains of the forest of large fir-trees between tide water-marks at a level where such trees could not be grown made the matter of the downthrow very evident. In many places around our shores submerged peat with tree-remains was found. On the occasion of a visit to Portrush in April, 1896, he was examining the exposed sections of peat at the West Bay, when he noticed the point of a piece of flint projecting from the weathered face, and on pulling this out it proved to be a well-formed flint-flake. A little examination with the blade of a knife showed that there were more flakes behind the one first noticed, and the result was that in two visits he collected about eighty flakes, about twelve cores, and a considerable quantity of chips, but no axes, scrapers, nor any example showing secondary workmanship. With the exception of two or three outliers, the flints were confined to an area of not more than two feet square. They formed a flattened heap; they rested on peat, and were overlaid by about one foot of exceedingly compact peat, and this in turn had been covered by about twenty feet of sand, now partially removed by sea-action.

The flints were firmly packed together; in fact, they were interlocked one with another, so that when working into the face it was sometimes difficult to get one out until the adjoining one had been loosened and dislodged. The whole find was evidently the heap which the old flintworker had formed at his feet while he sat at his work on the hard surface of the ground before some of the changes of level took place, which enabled a later growth of peat to come and cover up the surface, including the heap of flints. The flints were quite unweathered and unrolled, and had their edges as sharp as if they had been just made. Their colour was quite unchanged, being the same dull black or dark grey that freshly-broken flint presented. Many of the flakes were of exceptionally large size, with great heavy butts, while others were thin and delicately formed, reminding one of the modern gun-flint makers' flakes. The cores also resembled those from which modern flakes were struck. On the whole, the flakes and cores were much like those found in the Larne gravels, with the marked difference that instead of being rolled and weathered they were perfectly sharp and fresh. The flakes measured from one inch to five inches long, most of them, however, being about three inches. He noticed that some of those flints were marked with spots or splashes of a clear vitreous glaze, exceedingly thin and transparent, as if liquid glass had been dropped or splashed upon them. This glaze reflected the light, but seemed to be without any appreciable thickness. He presumed that silica in solution must have come in contact with some of the surfaces of the embedded flints, but further than this he could suggest no explanation of the matter.

BELFAST NATURALISTS' FIELD CLUB.

NOVEMBER 17.—The President (Mr. L. M. EWART) in the Chair. Mr. WILLIAM GRAY delivered a lecture on "The Origin and present Condition of the Giant's Causeway," which was discussed by F. W. Lockwood, J. M'Leish, Isaac Ward, R. M. Young, and S. F. Milligan. Replying, Mr. Gray reminded the members that their President was one of the defendants in the case now coming on, by which it was sought to exclude the public from the Causeway. He appealed to the members to assist the cause of the public by subscribing to the Defence Fund.

OCTOBER 21.—GEOLOGICAL SECTION. The monthly meeting was held, when rock-specimens from the Isle of Man were shown by Miss M. K. Andrews, including some "Crush Conglomerates," whose formation has recently excited considerable interest (see "The Crush Conglomerates of the Isle of Man," by G. W. Lamplugh, F.G.S., and W. W. Watts, F.G.S., *Journ. Geol. Soc.*, Vol. 51 (1895), p. 563, and Prof. W. J. Sollas, F.R.S., *Proc. Geol. Assoc.*, 1893, pp. 92-3, and 170.) Similar rocks occur at Portraine, Lambay, and elsewhere in Ireland, resulting from earth-movements. A collection of English fossils was shown by Mr. G. M'Lean, and Mr. R. Bell exhibited some interesting boulder-clay, with pebbles of Ailsa eurite and Cushendun conglomerate, from near Glenavy.

DECEMBER 15.—Rev. J. ANDREW lectured on "The Elemental Basis and Progressive Build of the Inorganic World."

BOTANICAL SECTION, NOVEMBER 28.—The course of study arranged for this winter comprises the principal British Natural orders of Plants, Oliver's well-known "Lessons" being used as the text-book. *Ranunculaceæ* to *Papaveraceæ* were discussed by the aid of fresh and dried specimens contributed by members.

DUBLIN NATURALISTS' FIELD CLUB.

NOVEMBER 17.—The PRESIDENT (Prof. GRENVILLE A. J. COLE) delivered an address on "The Natural Rights of Scenery." It was illustrated by numerous lantern-views. The speaker urged that natural scenery should be treated with respect, if only on account of its mental and moral effect on our own lives. We ourselves, as races of men, are moulded by the lands in which we live; and to use our surroundings for purposes of commercial gain or self-advertisement is to appropriate to ourselves, or to our own short generation, what is of world-wide and perpetual importance. Roads, railways, mills, could be established without permanent injury to scenery, if due care was taken by local authorities to preserve the rights of the landscape. The vagaries of the private owner were difficult to deal with, and the Scotch "Access to Mountains Bill" failed to restore moorlands to public use. Nothing short of nationalisation of scenery, a large scheme of land-nationalisation, could entirely safeguard such treasures as the Giants' Causeway. Mr. Lavens Ewart, President of the Belfast Field Club, is one of the defendants in the test-case now approaching. The charges for admission to natural scenery in Scotland and in Switzerland should be indeed a warning; long might it be before Irishmen withheld the hand of welcome to the stranger until sixpence dropped into its palm.

The paper was discussed by Rev. M. H. Glose, M.A., R. Lloyd Praeger and Endymion Porter.

Prof. T. JOHNSON, D.Sc., then presented a report as Delegate from the Club to the recent meeting of the British Association at Liverpool. He stated that at the Corresponding Societies Committee the question of local unions of scientific Societies was discussed, the subject being opened by a paper by Dr. Abbott, Secretary of the S.E. Union of Scientific Societies. A sub-committee was appointed to further consider the question, and the Club's delegate acted on the sub-committee. Prof. Flinders Petrie read a paper "On a Federal Staff for Local Museums"; in the discussion which ensued the Club's delegate took part. (See above under Belfast Nat. Hist. and Phil. Society).

J. G. ROBERTSON showed a beautifully preserved fossil amphibian from the Jarrow colliery, the skeleton being quite complete; also the jaw of a larger amphibian.

LIMERICK NATURALISTS' FIELD CLUB.

NOVEMBER 17.—Mr. F. NEALE read a paper on "Butterflies, when and where to find them," dealing with the collection and preservation of specimens, and illustrating his remarks by a fine series of insects, mostly collected in the Limerick district.

N O T E S.

BOTANY.

Irish Records In the Journal of Botany.

Mr. F. Townsend contributes to the November number of the *Journal of Botany* a paper on *Euphrasia Salisburgensis* Funk, found last summer by Rev. E. S. Marshall on limestone rocks south of Lough Mask, Co. Mayo. This is a Scandinavian and alpine plant, not hitherto recorded from the British Isles. "The plant is eminently alpine," and it is therefore of interest to find it not much above sea-level in Co. Mayo. "It is distinguished from all other British forms by its narrow leaves and bracts, with comparatively few lateral usually aristate teeth." The paper is accompanied by an excellent plate.

In the December issue, Mr. H. B. Rendle publishes a description of *Sisyrinchium californicum*, from plants collected last June by Rev. E. S. Marshall in marshy meadows near Rosslare, Co. Wexford. To the same number, Mr. Marshall contributes a paper on the results of his collecting last summer at Clonbur, on the borders of Mayo and Galway, Claremorris, and Wexford. The paper contains a number of valuable records, among the species being *Polygala oxyptera*, *Picris echioides*, *Chenopodium rubrum*, *Polygonum maculatum*, *Zostera nana*, *Eleocharis uniglumis*, *Chara conniveus* (new to Ireland), and *C. canescens*.

Flora of the Ox Mountains.

It was with much pleasure that I read in the December number of the *Irish Naturalist* Mr. N. Colgan's very interesting notes of the Flora of the Ox Mountains, Co. Sligo, and especially where he mentions having received specimens of the rare Maiden-Hair Fern from Mr. Quirk, taken from the banks of the Dromore West River; also stating, that in 1891, I reported the Fern from that locality. However, wishing "to give honour where honour is due," the credit of the discovery rests with Miss M'Munn, of Easky, who long before 1891 found it; but hearing from a mutual friend of Miss M'Munn's discovery, I visited the river in June, 1891, and found the fern growing profusely on the perpendicular face of the limestone rock, through which the river has cut a narrow passage eight or ten feet deep. The fern is growing on the eastern bank in two or three large patches, with smaller ones, and solitary plants, scattered along for a distance of twelve or fifteen yards; the largest patch forms a thick growth covering a span about four feet square, growing in a soft calcareous deposit from the water dripping over the rocky face of the bank. This fern appears to be very rare in the Co. Sligo, for in the *Cybele Hibernica* only one locality, four miles from the town of Sligo, is mentioned. When at Lough Talt, Mr. Colgan does not mention finding *Polyodium Dryopteris*; it used to grow on the road side between some stones at the base of the fence nearly opposite the Police Barrack, where I found it, and sent some fronds to my esteemed

and valued friend, the late A. G. More, and afterwards showed him some plants taken from that site, and growing in the garden here. The *Cybele* mentions this fern as growing only in the Counties of Antrim, Galway, Leitrim, and Kerry, and in the appendix, L. Talt, Co. Sligo, as reported by me.

ROBERT WARREN.

ZOOLOGY.

Irish Notes from the Zoologist.

In the September number, Mr. Charles Langham records the capture of a Whiskered Bat in Co. Fermanagh last June. The same observer writes confirming his note on the occurrence of an Iceland Gull in Co. Sligo on June 5th. Mr. C. B. Horsbrugh writes in the October issue that he has examined a specimen of a Night Heron (*Nycticorax griseus*) shot near Fermoy in March, 1894. Mr. R. Warren states that he received, on September 4th, a Ruff shot near Easky, Co. Sligo, and remarks that there appears to have been a small flight of Ruffs to Ireland last autumn, as Mr. E. Williams received three specimens for preservation, and Mr. Ussher had two sent him from Belmullet, Co. Mayo. In the same number mention is made of a large Pike, forty nine inches long and 35 lbs. in weight, taken with a spoon-bait in Lough Conn.

AMPHIBIANS.

Is the Frog a native of Ireland?

It is curious that the question propounded by Dr. Scharff (*J. Nat.*, vol. ii.) relative to the introduction of the Common Frog into this country has not elicited more information. Mr. Ussher's explanation that the remains of frogs found in Ballynamintra cave were found in the surface stratum, removes one possible evidence of their antiquity in this country. But no one has alluded to an attempt at colonisation made previously to the one mentioned by Thompson in the grounds of Trinity College—namely, that which is referred to by O'Halloran in his "History of Ireland," published 1772. He gives the Latin verses in full, from which Dr. Scharff quotes (after Camden), headed "An account of Ireland given by Donatus Bishop of Fesulae (or Fiesoli), near Florence, above 1100 years ago" (*sic.*) After the lines

" Nulla venena nocent, nec serpens serpit in herba
Nec conquesta canit garrula rana lacu,"

he adds a note as follows :—"We must here remark that we never had frogs in Ireland till the reign of King William. It is true some mighty sensible members of the Royal Society in the time of Charles II. attempted to add these to the many other valuable presents sent us from England, but ineffectually ; as they were of Belgic origin, it would seem they could only thrive under a Dutch Prince, and these with many other exotics were introduced at the Happy Revolution."

This testimony of a writer about seventy years after the undoubtedly introduction of a colony of this animal seems conclusive that at the period at which he wrote it was numerous in the country; while his assertion that at some date between 1662, when the Royal Society was founded, and 1685, when Charles II. died, a former attempt at colonisation was made (whether successfully or unsuccessfully), shows that the frog was at that time not known to be indigenous. Perhaps some one may be induced by this notice to search for some record of the futile attempt made by these "mighty sensible" Fellows. The reference as to the animals being of "Belgic origin" would seem to suggest that they were imported from Holland. Perhaps, therefore, they might have been the edible species *Rana esculenta*; and the failure, referred to by Dr. Scharff, of Dr. Birney's introduction, may have been paralleled by that of a similar importation to Ireland.

W. F. DE V. KANE.

BIRDS.

Black-tailed Godwit in Queen's Co.

Through the kindness of Lord Castletown, I have received, and sent to Messrs. Williams & Son for preservation, a specimen of the Black-tailed Godwit, shot near Granston Manor, Abbeyleix, on the 13th November inst.

R. J. USSHER.

GEOLOGY.

The Determination of Fossils.

All who have attempted to determine a miscellaneous collection of fossils from any geological formation have soon discovered the difficulty of affixing correct names to all the specimens, and if they have been doing this work with the object of publishing some paper, either dealing with the stratigraphy of a district, or attempting to correlate geological horizons in different parts of the world, they have probably given the task up in despair. A few, no doubt, have been fortunate in possessing friends whose knowledge of particular groups of fossils could be drawn upon. But it is not always that one knows the best person to apply to, or that one can be certain of a favourable reception. *Natural Science*, in its December number, has published a list of twenty-six specialists, who are willing to determine various groups of fossils from various strata, when requested to do so for purposes of publication, and this enterprising action will doubtless be welcomed by many local geologists. We hope that this list is only a first instalment, for there certainly appear to be a large number of groups of fossils in which no one is prepared to pose as an authority. We should have thought, for instance, that some one might have been found for the Trilobites, for the Belemnites, or for Palaeozoic Brachiopods. Obviously, if anyone wishes to take up the study of some special division of palaeontology, he need not be deterred by the lack of an opening.

THE FORMER ABUNDANCE OF GRANITE BOULDERS IN THE S.E. NEIGHBOURHOOD OF DUBLIN.

BY REV. MAXWELL H. CLOSE, M.A., F.G.S.

(Read before the Dublin Naturalists' Field Club, 8th December, 1896.)

THE presence and distribution of boulders in a particular district is generally very interesting, and indeed often geologically significant and important, in various ways. But unfortunately in such a neighbourhood as that of Dublin they are specially liable to be removed for various reasons. When they interfere seriously with the cultivation of the land we cannot blame the farmers for getting rid of them, and when a great deal of building material is required we cannot wonder at the contractors breaking them up and carrying them off from rough wild uncultivable places where the farmers would let them remain. But the extensive removal of them may hereafter cause perplexity to geologists, and even lead them into error, if they should be not sufficiently aware of the former state of things. These remarks apply very specially to the southeast neighbourhood of Dublin, where there has been such extensive destruction of boulders. When the Geological Survey were at work in this district they had not begun to pay as much attention to surface geology as they did afterwards, so that the Explanations of Sheet 112 say nothing on the limited subject of this communication ; it seems, then, desirable that the Dublin Field Club should record the facts with which we are now concerned.

The granite boulders of this region do not generally belong to the bonlder-clay. They usually lie on it, though they are often partially buried in the drift. They are generally of later date than the detrital deposits on which they rest, and have sometimes moved in a direction contrary to that in which the latter have been carried. This can be seen near the westward edge of the granite district, as, for instance, in the lower part of Glennasmole, where the deep deposit of limestone materials has come from the plain country on the west, and the overlying granite boulders from the eastward.

The extensive disappearance of these boulders from the district now in question has doubtless been observed by

many persons. I happen to have been peculiarly well circumstanced for being impressed thereby. In the years 1834-5 my family was living at Beechwood, near the S.E. end of Rochestown Avenue, at the foot of Rochestown Hill, the most southward of the three Killiney Hills. The ground from Beechwood on towards Ballybrack was thickly sprinkled with granite boulders, large and small. This was so on both sides of the road to Ballybrack ; although some clearance was going on on the lower or westward side of the road. The speckled appearance of the district, owing to the contrast between the dark green furze and the light grey boulders, was very striking ; and there can be no doubt that it was this which gave name to the locality—"Ballybrack" meaning the "speckled place." There is another place of the same name a few miles off, viz. : the upward, north-westward continuation of Glencullen behind the mass of the Three Rock Mountain. It doubtless received the same name for the same reason ; although the speckling is not there so strongly marked, being somewhat obscured by the heather and the peaty covering of the ground. Thirty-two years ago, although the fields on the lower, or westward side of the first-mentioned Ballybrack road, were perfectly cleared of boulders, a most interesting relic of the former state of things was preserved in a belt of plantation, near Kilbogget Farm, which is on a way or passage from near Cabinteely to the said Ballybrack road. That plantation had been made before the clearance of the land, and the contrast between the boulder-encumbered ground within it and the smooth fields on each side was most striking and interesting. I fondly hoped that, as the boulders were out of the way of the plough, they would remain there as a memorial of the past ; but, on visiting the place a few days before reading this paper, I was greatly disappointed to find that they had been taken away for building purposes. No signs of them now remain except the hollows showing where the larger or more deeply sunk ones stood. I happened to meet Mr. MacCormick, who now occupies the farm ; he was fully aware of the former state of the ground about there, though it was before his time.

Mr. G. H. Kinahan, of the Geological Survey, corroborates what I have said as to this locality, and speaks also of his own

recollection of a similar state of things in places about Killiney and Dalkey. Gabriel Beranger, who has left some valuable drawings depicting antiquarian and other objects, some of which have been destroyed since his time, expresses his delight at the "romantick" rocks about Dalkey, and mentions that a wheeled vehicle could not pass along the street of the village. This was doubtless largely due to the boulders now in question. He gives drawings (both dated 1776) of two of these, one a rocking-stone near the sea, about a musket-shot west of Bullock, measuring 10 ft. 9 in. by 6 ft. 2 in. by 3 ft. at its thickest side. This was very conspicuous to every passer-by; it was what glacialists call a perched block on the top of what his drawing shows to have been a *roche moutonnée*, which was weathered along some vertical joints. This stone, however, had ceased to rock a few years before he saw it; and it has since ceased to exist, that is in its integrity. He gives also a drawing of a magnificent boulder "on the top of Dalkey Hill," not necessarily meaning at the very summit. It covered a small well, and was called *Clogh Tubber Gileen*—the Stone of Gileen's Well. Its dimensions were 22 ft. 6 in. by 10 ft. 4 in. by between 11 and 12 ft. in height. Supposing it to have been rudely ellipsoidal in shape, with which the drawing is consistent, its weight must have been at least 140 tons. I made inquiry about this lately from several old people of the locality, but none of them had ever heard of it. The cromlech, with its circle of large stones round it, which existed on Dalkey Common until it was broken up to build the nearest Martello tower, was of course composed of boulders which the cromlech-builders had at hand. By way of some small relief to the melancholy account just given, let us note the survival of a fine boulder, a perched block, still standing on a *roche moutonnée* near, and visible from, the public park near Sorrento Terrace. It is somewhat cuboidal, and measures 8 by 6 by 6 feet. Its effect, however, is sadly marred by the fact that it is now in the little parterre of a villa shut in by walls. It is evidently prized by the present occupants, who perhaps belong to the Field Club; it stands, then, a good chance of being preserved. At the same time it reminds us too strongly of that melancholy sight, a caged eagle; and one is almost (not quite)

tempted to wish that some kindly building-contractor would blow it to pieces, and allow us to forget it.

A few respectable boulders can still be seen in favourable out-of-the-way places, and near the hills, in the country extending from the Killiney Hills to Stillorgan, Whitechurch, &c. But it is easy to see what became of the great majority of the field-stones; they were used up to build the walls which enclose such a large proportion of the fields in that district. Mr. Kinahan informs me that the numerous boulders lately in the valley between Enniskerry and Glencullen have been nearly all taken away to build the Catholic church at Enniskerry. He informs me also that most of the large number of boulders about Ballinteer, beyond Dundrum, were used up for building purposes a few years ago. Much of the granite for the Science and Art Museum, Kildare Street, was obtained from the boulders between Ballinteer and Dundrum. He speaks also of a great removal of boulders in late years from Redesdale on the S.E. of Dundrum, and from other places not far off.

I must not omit to mention an interesting museum of boulders, as we may call it, at Newtownpark, about a mile inland from Blackrock. The obelisk there is of ashlar work rising from a very large rusticated base; the stones of the latter are clearly all boulders gathered from the surface of the surrounding land. Some show signs of blasting; but these are only portions of much larger boulders which, in their integrity, would have been too difficult to transport to their present situation. Many of them are four feet in length. There can be no doubt that the squared blocks of the obelisk itself were cut from boulders. This structure was built in 1703; it would be impossible to make the like of it in these days without having recourse to quarrying, so that it is a most interesting memorial of the state of things in by-gone days.

The largest surviving boulder that I know of in this region is situated about a mile south of the cromlech and the ancient church of Kilternan. Unfortunately, a new road was made passing close to it, and a great piece has been blasted off it, which interfered with the road.

Perhaps I may be allowed to mention here the relation of the cromlechs to our present subject. These are usually, but

it would seem not invariably, composed of boulders. Though we sorely grudge that our grand Dalkey boulders should be broken up by the building-contractors and made into prim villas and terraces, often with odious fashionable Italian names, yet I think we may agree more or less cordially to some of them being appropriated by the cromlech-builders. Those men prized them for their size, they did not destroy them; though possibly, in a few cases, they may have interfered with their natural or geological interest. There can hardly be any doubt that they have sometimes been the means of preserving some of the finest boulders for us. Notwithstanding that the ordinary Philistine would think nothing at all of blasting to pieces an unusually large boulder, though it were a most striking perched block, yet it is conceivable that he might relent if he saw the boulder playing the part of the covering-stone of a cromlech. The great probability is that the top stone of the Brennanstown cromlech and that of the Shanganagh cromlech escaped demolition in this way when the surrounding ground was cleared as we now see it.

I may here observe that the removal of the boulders from the ground about a cromlech heightens the effect of the latter; it is however a factitious addition to the great interest that a cromlech must always have for us. It makes some persons imagine that the large covering-stone has been brought from some distant spot, where there were boulders, to its present position where none are now to be seen. But it is most reasonable to think that the cromlech-builders looked about for the largest boulder that they could find near enough to the desired site of their monument, and collected the smaller supporting stones around it, and then built their cromlech there.

The boulders mentioned in this paper are all of granite and rest on granite ground, except those at the western edge of the granite alluded to above; so that we have no means of knowing how far they may have travelled from their native site.

THE BATS OF IRELAND.

A CONTRIBUTION TO OUR KNOWLEDGE OF THEIR DISTRIBUTION.
BY H. LYSTER JAMESON, B.A.

A FEW years ago I took up the study of the species of bats which occur in Ireland, intending to retain my information until I could present a fairly complete account of the distribution of at least the commoner species, rather than to record my observations in a number of scattered notes. My experience since then, and the consideration that this paper may possibly draw out some data that are unknown to me, in the correspondence columns of the *Irish Naturalist*, prompts me to publish this list of records in its present incomplete state, rather than to wait indefinitely for data that are not forthcoming.

It is more than possible that some already published records may have been overlooked by me, but I have no doubt if such is the case, my omissions will be corrected by the readers of this Journal.

It is much to be regretted that field naturalists have paid so little attention to this group in Ireland, for we can hardly boast of having advanced very much since Prof. Kinahan wrote¹ "as a general rule every bat seen flying about is put down in the naturalist's book as the Pipistrelle." Records of this kind are apt to be misleading and should be strongly discouraged; to say nothing of the fact, pointed out by Kinahan, that the "common bat" of parts of Clare seems to be the Lesser Horse-shoe Bat. This careless method of naming species led to the formerly frequent descriptions and record of the Pipistrelle in Great Britain as "*Vespertilio murinus*," merely because *V. murinus* is the common bat of some continental localities!

The difficulties of identification of *species* need not hinder any observing naturalist from having a clear idea of at least the *generic* distinctions, which would no doubt save many a rare *Vespertilio* from being thrown away, or, worse, recorded as *Vesperugo pipistrellus*. Even on the wing a sufficient amount may often be seen to suggest to the collector that the specimen is worth capturing, while the flight of *Vesperugo Leisleri* and *Vespertilio Daubentonii* are almost unmistakable.

¹ *Proc. Dub. Nat. Hist. Soc.*, vol. 1, p. 154.

I shall not say anything about methods of capture and preservation, as I have already alluded to the most successful in a previous paper.¹

It is to be regretted that the scanty information at hand permits of but little generalizing with regard to questions of distribution ; such data as I am able to put before the readers of the *Irish Naturalist* in these pages suggest that the three species of *Vespertilio* which have hitherto been regarded as extremely limited in their range, may be widely if not generally distributed ; as is the case with the better known species of mammals, except where locally exterminated by man.

But what is likely to be the range of the Lesser Horse-shoe Bat? At present only recorded from Galway and Clare, it may possibly prove to have a limited range, and so form a marked exception to what seems to be the rule for Irish mammals generally. Further explorations alone can settle this question, as also whether or not *Vesperugo Leisleri*, now known to be fairly widely distributed in the North and East, and as far south as Cos. Wicklow and Kildare, occurs in the South and West.

But a perusal of this paper will make it evident that we are far from having complete records of the range of even the Pipistrelle and Long-eared Bats, and I can only express once more the hope that this very incomplete list will call forth some of the data, published or unpublished, that may have escaped me.

I must take this opportunity of expressing my gratitude to the many kind friends from whom I have received specimens and records, and particularly to Rev. D. C. Abbott, Mr. G. E. H. Barrett-Hamilton (for many notes collected by himself and his correspondents), Mr. R. M. Barrington (for records from Light Stations on the Irish Coast), Mr. C. Black, Mrs. Dunsterville, Rev. R. M. P. Freeman, Mr. W. Garstin, Mr. W. F. De V. Kane, Miss Kelsall, Rev. A. Knight, Dr. W. R. MacDermott, Rev. F. W. Moeran, Mr. E. Porter, Dr. R. F. Scharff, Mr. R. J. Ussher, Mr. R. Warren, and others.

Seven species of bats are known to inhabit Ireland, six of which belong to the family *Vespertilionidae*, represented by

¹ *Irish Nat.*, 1894, p. 69.

three genera *Plecotus*, *Vespertilio*, and *Vesperugo*, the seventh to the family *Rhinolophidae*

Rhinolophus hipposideros, Bechstein.

LESSER HORSE-SHOE BAT.

Co. CLARE.—First recorded as Irish by Mr. F. J. Foot (*Proc. Dub. Nat. Hist. Soc.*, vol. ii., p. 152), who found it in Ballyallia cave near Ennis in 1857, and in a cave near Quin in 1859. Subsequently found by Professor Kinahan and Mr. Foot in 1861 in Vigo cave, Inchiquin; and also in a small cave in a plantation on western shore of the lake. The entrances to both these caves were overhung by ivy and ferns. Also in three caves at Edenvale near Ennis.

Prof. Kinahan regarded this species as the "Common Bat" of Co. Clare. [See Kinahan, *Proc. Dub. Nat. Hist. Soc.*, vol. ii., p. 154. Also *Zoologist*, 1861, p. 7617.]

Prof. Kinahan refers to a larger bat, known to the country people in Clare, of which he did not procure a specimen, and which consequently must remain unidentified until some enterprising naturalist can secure it.

Co. GALWAY.—A specimen was captured by Prof. King in June, 1858, in a house in Galway into which it had flown. It was exhibited before the Dublin University Zoological and Botanical Association in 1859.

There are two specimens in the Science and Art Museum, Dublin, taken at Cool Park, and presented by the late Mr. A. G. More.

[I may here refer to an account of what appears to have been a *Rhinolophus* from Co. Westmeath, mentioned by Mr. M'Coy in a paper before the Dublin Natural History Society, which paper was reported in *Saunders's News-letter*, Feb. 12th, 1845. The scanty description suggests *R. ferrumequinum*, which is not known to inhabit Ireland.]

Plecotus auritus, Linn.

LONG-EARED BAT.

Co. DONEGAL.—Mr. Barrett-Hamilton informs me that one was seen at the lantern at Arranmore Light-station in June, 1889, by J. F. Fortune. This species is recorded by J. V. Stewart. (*London's Mag. Nat. Hist.*, vol. v., 1832, p. 578).

Co. LONDONDERRY.—Colony discovered in June, 1835, "under slates of Foyle House, above the city."—("Ordnance Survey of Co. Londonderry," by Lieut.-Col. Colby. Dublin, 1835.)

Co. ANTRIM.—Two specimens in Science and Art Museum, Dublin, from Cushendun, presented by Rev. S. A. Brenan, July 24th, 1895. A female was sent to me by Mr. C. Black, from Langford Lodge, Crumlin, in April, 1895. I received a specimen on July 22nd, 1896, with Antrim post-mark, but unaccompanied by sender's name.

Co. DOWN.—"Met with everywhere."—(Alex. Knox, M.D., "History of Co. Down"; 1875.)

CO. ARMAGH.—Loughgilly; common; I have found the species there myself, and have since received specimens. I have also received it from Poyntzpass (Dr. W. R. MacDermott); and from Drumbanagher (Rev. F. W. Moeran).

CO. MONAGHAN.—Mr. W. F. De V. Kane tells me that this species occurs at Drumreaske.

CO. CAVAN.—I found a large colony in the tower of Kilmore Cathedral, in July, 1896, during the Field Club's excursion to that district.

CO. FERMANAGH.—Bohœ Caves; Rev. A. Knight (recorded by me, *Irish Nat.*, April, 1896).

CO. TYRONE.—Aughnacloy (Kinahan; *Proc. Dub. Nat. Hist. Soc.*, vol. ii., p. 154). Mr. Barrett-Hamilton has been informed by Mr. C. Irvine that this species is common in Tyrone and Fermanagh.

CO. LOUTH.—There is a large colony in the roof of Charlestown church; and I have also found specimens in Louth church, and Killencoole church. I have received specimens from Knockbridge and Stepliens-town.

CO. MEATH.—A specimen in the Science and Art Museum, Dublin, is labelled "Nobber, Co. Meath."

CO. DUBLIN.—"Common in many localities," (Kinahan; *Proc. Dub. Nat. Hist. Soc.* vol. ii., p. 154); recorded as "frequent" by Barrington (*Brit. Association Guide to Cos. Dublin and Wicklow*, 1878). There is a specimen from Rathfarnham in the Science and Art Museum, two specimens labelled "Dublin" in Trinity College Museum, and specimens have been sent to Mr. Williams from Lucan and the city.

CO. WICKLOW.—"Frequent" (Barrington, *Brit. Assoc. Guide*). Mr. C. J. Patten has a specimen from Bray in his collection; McCoy records a large colony in the roof of Castlemacadam church (Report of Dub. Nat. Hist. Soc., in *Saunders's News-letter*, Feb. 12, 1845).

CO. WEXFORD.—Mr. Barrett-Hamilton tells me this species occurs at Kilmanock, and at Ballyhyland.

CO. KILDARE.—Specimen taken by Mr. F. Haughton, formerly in Royal Dublin Society's collection (Kinahan; *Proc. Dub. Nat. Hist. Soc.*, vol. ii., p. 154).

CO. CARLOW.—A specimen from Oak Park was sent to me by Mr. Barrett-Hamilton.

KING'S CO.—Mr. Barrett-Hamilton informs me that this species occurs at Edenderry.

CO. LONGFORD.—Specimen in British Museum from this county, presented by the late Dr. Dobson.

CO. WATERFORD.—Common at Cappagh (Mr. R. J. Ussher); a large colony in Cappagh church. There is a specimen in Science and Art Museum, Dublin, from Dungarvan, presented by Mr. Ussher.

CO. CORK.—"Common" (Cusack; *History of Co. Cork*); Thompson says (*Nat. Hist. Ireland*) "Dr. R. Ball considers it more common than the Pipistrelle about Youghal." Castlefreke (Darling, *Zoologist*, 1893, p. 294).

CO. KERRY.—Thompson tells us that “Mr. F. J. Neligan is of opinion that the Long-eared Bat is more common than the Pipistrelle in Co. Kerry.” A specimen was taken at Teraglit Light-house, nine miles off the coast, on November 17th, 1891, and sent to Mr. Barrington.

CO. TIPPERARY.—Mr. H. J. Charbonnier, of Bristol, informs me that he received a specimen from Carrick-on-Suir in September, 1893.

CO. LIMERICK.—Mr. Barrett-Hamilton has received records of this species from Limerick.

CO. GALWAY.—Hon. R. H. Dillon tells me that the Long-eared Bat occurs at Clonbrock.

CO. MAYO.—Ballina; “not common” (Mr. R. Warren).

GENERAL.—It may be worth noting that there is a buff-coloured individual of this species in the Science and Art Museum, Dublin, labelled “Ireland.” It is strange that in the “Guide to Belfast and adjoining Counties,” published by the Belfast Naturalists’ Field Club, this bat is merely recorded as “having been observed” in that district, “but the Pipistrelle alone is common.”

The partiality of this species for the roofs of churches should make it a matter of comparative simplicity to determine its exact range in Ireland. I have also found it in a hole in an old building, about four feet from the ground, and Mr. Knight took it in the caves at Bohoe.

I am familiar with the Long-eared Bat on the wing at night, and have usually found it flying low down along hedge-rows or in old country lanes with high hedges on either side. Early in the evening it can often be identified on the wing, owing to its immense ears.

Vespetilio mystacinus, Leisler.

WHISKERED BAT.

CO. FERMANAGH.—A specimen was killed in Bohoe rectory on July 10th, 1895, by Rev. A. Knight (see my paper *I. Nat.*, April, 1896). This specimen is now in the Science and Art Museum, Dublin.

Another was sent to me from Bellisle, Lisbellaw, by Mr. E. Porter, in August, 1896. This specimen was captured in a room, and is now in my collection.

Mr. Charles Langham records a specimen captured at Tempo Manor in June, 1896.—(*Zoologist*, 1896, p. 350.)

CO. LOUTH.—I have twice taken this species at Killencoole, where I have reason to believe it is not uncommon; both specimens were captured in the summer of 1894; the first I knocked down with a carriage-whip, when on the wing, the second I captured a few days later in the roof of an outhouse. I have also received a young specimen from Braganstown, found clinging to the wall of the house by Mr. W. Garstin. It is much more darkly coloured than the adult specimens. These three specimens are in my collection.

CO. CLARE.—The first Irish record of this species is by Kinahan; a specimen was brought to him by a cat, at Feakle, Co. Clare. This specimen, first recorded as *V. Daubentonii* and exhibited as such before the

Dublin Natural History Society in Feb., 1853, was subsequently discovered to be *V. mystacinus* and recorded under this name.—(*Proc. Dub. N. H. Soc.*, vol. i., p. 148.)

Vespertilio Nattereri, Kuhl.

NATTERER'S BAT—REDDISH-GREY BAT.

Co. DONEGAL.—One found dead at Carrablagh, by Mr. H. C. Hart, in June, 1891, now in Science and Art Museum, Dublin (*Zoologist*, 1891, p. 271).

Co. FERMANAGH.—I found, on looking over some specimens of *V. Daubentonii*, sent me from Bohoe caves by Rev. A. Knight, two specimens of this bat; they were killed at dusk in the cave, in company with the specimens of Daubenton's Bat, and a *Plecotus auritus*.

Co. LOUTH.—One captured at Dundalk in June, 1893, and recorded by me (*Irish Nat.*, August, 1893).

Co. WICKLOW.—A specimen was killed by Mr. G. Mangan at the Scalp in 1845.—(*M'Coy, Ann. and Mag. Nat. Hist.* (1), vol. xv., 1845, p. 270.)

The various records from "Dublin," "Wicklow," "Enniskerry," near the city," &c., evidently refer to this specimen.

Co. LONGFORD.—A specimen in British Museum, presented by Dr. Dobson, is from this country.

[Co. KILDARE? See under *V. Daubentonii*.]

Vespertilio Daubentonii, Leisler.

DAUBENTON'S BAT.

Co. DONEGAL.—Lydekker (*British Mammals*, p. 44) states that this species has been recorded from Co. Donegal.

Co. LONDONDERRY.—A specimen was obtained by the Ordnance collectors in 1838. (*Thompson, "Natural History of Ireland."*)

Co. DOWN.—Knox records this species in his "History of Co. Down" as "very rare," not stating any locality. Possibly he refers to the Derry specimen.

Co. FERMANAGH.—I found two large colonies of this bat in Bohoe caves in July, 1895, and subsequently received other specimens from Rev. A. Knight from the same locality. Some of these are in the Dublin Museum.—(*Irish Nat.*, April, 1896.)

Co. LOUTH.—I observed a number of specimens flying over the river at Braganstown (River Glyde) and knocked one down with a carriage-whip; this specimen I have in my collection. They came out early at first, flying fairly high, but even then the pale colour of the fur on the underside made them appear quite distinct from other species. Later, when it became darker, they adopted their peculiar method of flight, skimming over the surface of the water and occasionally touching the surface, leaving a faint ripple behind them. Mr. W. Garstin, who was with me when I secured my specimen, told me he was familiar with this bat on the river at Braganstown, but had never suspected that it was a rare species. Possibly other observers may have remarked it elsewhere, passing it by as a Pipistrelle.

Co. KILDARE.—A colony was discovered in June, 1853, by the late Prof. Kinahan, at Tankardstown Bridge, between Kildare and Queen's County, in a hole in the masonry, about four feet above water-level. First observed by Mr. F. Haughton on the River Barrow. These specimens, collected by Prof. Kinahan, were at first identified as *V. Nattereri* (*Dub. Nat. History Review*, vol. i., p. 22), and the mistake was subsequently corrected, pp. 148-9. The confusion about the identification, and the records of the discovery, suggest that Daubenton's Bat was accompanied by *V. Nattereri* at Tankardstown, and it is definitely stated that one specimen had a fringe of bristles on the interfemoral membrane (p. 87), which could not, therefore, have been *V. Daubentonii*. There is nothing to prevent the two species having occurred in the same hole, as there were Pipistrelles along with them also; and the discovery by Mr. Knight of the Reddish-grey Bat in company with *Vesperilio Daubentonii* at Bohoe supports this conclusion.

Co. WEXFORD.—Mr. R. M. Barrington received a specimen from Lucifer Shoals Light-ship which was caught "flying low over the deck" at 7.30 p.m. on April 21st, 1891. The Light-ship is nine miles from the mainland.

Vesperugo pipistrellus, Schreber.

COMMON BAT—PIPISTRELLE.

Co. DONEGAL.—Ballyshannon, "plentiful" (Alingham's "Ballyshannon," Londonderry, 1879); I have observed it at Cloghan, near Stranorlar; there is a specimen in Dublin Museum labelled "Co. Donegal," presented by Mr. Hart.

J. V. Stewart ("Mammals and Birds of Donegal," *Loudon's Mag. Nat. Hist.*, vol. v., 1832) speaks of "Vesperilio murinus, the Short-eared Bat," probably referring to this species.

Co. ANTRIM.—"The only common species" (Belfast Naturalists' Field Club "Guide to Belfast and adjacent Counties"); I have received specimens from Mr. C. Black, Langford Lodge, Crumlin, in June, 1894; and in August, 1895, I found three complete skulls of this species in pellets cast up by owls, also sent from Langford Lodge by Mr. Black. Mr. C. J. Patten has a specimen from Antrim town in his collection.

Co. DOWN.—"Met with everywhere" (Knox, *Hist. Co. Down*); I have received this species from Crossgar.

Co. ARMAGH.—At Loughgilly I found this species extremely plentiful; I have also seen it at Poyntzpass.

Co. MONAGHAN.—Mr. W. F. De V. Kane informs me that the Pipistrelle occurs at Drumireske; and I have received a specimen from Rev. D. C. Abbot, taken at Monaghan town.

Co. FERMANAGH.—On July 11th, 1895, I found a large colony in Bohoe Church (*Irish Naturalist*, April, 1896); and Mr. E. Porter sent me, in July, 1896, a number of specimens taken in an old coal-house near the lake at Lisbellaw. Mr. Barrett-Hamilton has been informed of its occurrence at Castle Irvine.

Co. CAVAN.—When in Cavan with the Field Club excursion in July, 1896, I found a colony of this Bat at Farnham House, and secured several specimens. I have since received specimens from Killeshandra.

Co. TYRONE.—I have received a specimen from Dungannon, sent by Mrs. Dunsterville.

Co. LOUTH.—I have met with this species plentifully at Killencole and Charlestown, and have received specimens from Dundalk (Mr. G. J. Garratt), and Collon (Rev. R. M. P. Freeman).

Co. DUBLIN.—Common (Kinahan, *Proc. Dub. Nat. Hist. Soc.*, vol. ii., p. 154; Barrington, "Brit. Association Guide to Cos. of Dublin and Wicklow," 1878). Kinahan mentions a specimen from Dundrum.

Co. WICKLOW.—See under Dublin.

Co. WEXFORD.—Mr. Barrett-Hamilton informs me that this is the commonest species at Kilmanock, and that it occurs at Ballyhyland; also that there is a stuffed specimen in White's Hotel, Wexford, which was caught in a room in the hotel.

Co. KILDARE.—One captured at Levetstown in 1853 (J. R. Kinahan, *Dub. N. H. Review*, vol. i., p. 25). Found in company with *V. Daubentonii* at Tankardstown.

Co. CARLOW.—Mr. Barrett-Hamilton tells me that he received a specimen from Mr. P. Beresford, taken at Fenagh in Sept., 1890.

Co. LONGFORD.—A male in British Museum, presented by Dr. Dobson, is from this county.

Co. WATERFORD.—Common at Cappagh (Mr. R. J. Ussher).

Co. CORK.—"Common" (Cusack, *Hist. Co. Cork*); Youghal, Thompson (see under *Plecotus auritus*). I received specimens from Mallow captured by Miss F. Massy in August and September, 1893.

Co. KERRY.—Thompson (see under *P. auritus*); mentioned also by Kinahan (*Proc. Dub. Nat. Hist. Soc.*, vol. ii., p. 154).

Co. LIMERICK.—"Plentiful" (Mr. H. Martin, per Mr. Barrett-Hamilton).

Co. MAYO.—Ballina, common (Mr. R. Warren).

Co. SLIGO.—Ballymote, one captured by myself in June, 1892.

***Vesperugo Leisleri*, Kuhl.**

LEISLER'S BAT—HAIRY-ARMED BAT.

Co. ANTRIM.—First recorded as Irish by Prof. Kinahan in *Proceedings* of Belfast Nat. Hist. and Phil. Society, April, 1860, from specimens taken at Belvoir Park in 1848, and in Belfast in 1858. (See Kinahan, *Proc. Dub. Nat. Hist. Soc.*, vol. ii., p. 154.) I have received it from Langford Lodge (Mr. C. Black).

Co. DOWN.—I received from Mrs. Dunsterville a specimen taken at Newry in August, 1894. (See under Antrim, "Belvoir Park.")

Co. ARMAGH.—Found in numbers in 1868 and 1874 in demense at Tanderagee by Mr. Barrington (*Zoologist*, 1874, p. 4017); and at Tarataraghan in 1875, by Rev. G. Robinson (J. Gatcombe, *Zoologist*, 1875, p. 4419). I frequently observed this Bat at Loughgilly, and have in my collection a male which I shot there in June, 1891.

CO. FERMANAGH.—Mr. Barrington found a colony in the roof of a boat-house at Crum Castle in June, 1882 (*Zoologist*, 1883, p. 116). Mr. C. J. Patten has in his collection a specimen taken at Derrylin in 1887. A specimen taken in a room in Bohoe Rectory was sent to me in July, 1895.

CO. CAVAN.—While I was in Cavan with the Field Clubs in July, 1896, Mr. S. Jones brought me a specimen, which he had picked up dead in the town of Cavan. Since then I have received specimens from Killashandra.

CO. LOUTH.—I have shot this species at Killencoole and Bragaustown, at both of which places it is very plentiful.

CO. DUBLIN.—Glasnevin, July, 1874 (J. D. Ogilby, *Zoologist*, 1874, p. 4236); there are specimens in the Dublin Museum labelled "Dublin," "Finglas," and "Dunsink"; a specimen was shot at Carrickmines by Mr. E. C. Barrington (*Zoologist*, 1893, p. 427); I have received a specimen from Blackrock (Miss E. J. Kelsall), and have observed it on the wing in the same locality.

CO. WICKLOW.—Fassaroe, Bray (Barrington, *Zoologist*, 1875, p. 4532); Mr. Barrington has met with this species more than once since, and I have seen it on the wing at Fassaroe.

CO. KILDARE.—Specimen shot at Levistown by Mr. F. Haughton in June, 1874.

CO. GALWAY.—Hon. R. E. Dillon tells me he is familiar with a large bat at Clonbrock, but a specimen he sent me unfortunately never reached me; and as we have so far no certain West of Ireland records of *V. Leisleri*, we must wait for specimens before assuming that this species occurs there.

With regard to the reported occurrence of *V. noctula* in Ireland, and certain questions relating to *V. Leisleri* which are raised thereby, I hope shortly to publish another paper.

BATS AT LIGHTHOUSES.

The following records from the Irish Light-stations, as reported by Mr. Barrington's correspondents in the "Migration" schedules, have been supplied to me by Mr. Barrington:—

1884. Rockabill Lighthouse (5 miles off Dublin Coast): "July 14th—Bats about light all night; wind light, S.W." This is the first entry of "bats" Mr. Barrington received from his correspondents.

1886. Fastnet Lighthouse (8 miles from coast of Cork): "October 3rd one bat seen, sleeps in cleft on rock."

1889. Arranmore: see under *Plecotus auritus*.

1891. Lucifer Shoals Lightship (9 miles off Wexford coast): "April 21st—Bat caught at 7.30 p.m., flying low about ship, striking man on watch; it died next day. Wind N.E., moderate; weather clear." This specimen was sent to Mr. Barrington and proved to be *V. Daubentonii*.

Blackrock, Mayo (lighthouse, 9 miles off shore): "August 18th—one bat about rock at night."

Tearaght Lighthouse (9 miles off coast of Kerry).—On 17th November, a Long-eared Bat flew into one of the houses at dusk. Mr. Barrington received this specimen on January 23rd, 1892.

1892. Drogheda, N. light: May 13th—"Two bats in evening, flying close to station; wind light, S.W.; first seen here." June 9th—"Three bats flying about station at 10 p.m." (Lighthouse at end of sand-hills near shore.)

1894. Drogheda, N.: June 12th—"Several bats flying about at 9.30 p.m. Wind moderate, N. Weather gloomy. First seen for a long time."

I regret that I can procure no information as to the occurrence of Bats on the islands off the Irish Coast; possibly some readers of the *Irish Naturalist* can produce some such records.

A PLUME-MOTH NEW TO THE BRITISH ISLES.

BY CHARLES G. BARRETT, F.E.S.

AMONG some Micro-lepidoptera recently sent to me for examination by Mr. W. F. de V. Kane are several specimens of *Platyptilia tesseradactyla*, L. (*Fischeri*, Z.), a very pretty little "plume" moth not previously known to occur within the limits of the United Kingdom. It is much like *Platyptilia gonodactylus*—the species found among *Tussilago farfara*, but less than one-half its size, yet having a very similar form of wings and dark triangular blotch on the fore-wings before the fissure. Outside this blotch we find white transverse bars on the dark grey-brown ground-colour, and before it are two or three dark spots. The hind wings are dark smoky fuscous, with a yellowish dash in the cilia at the tip of each fissure, and a blackish spot on that of the hind lobe.

These specimens were taken by Mr. Kane and the Hon. R. E. Dillon, near Clonbrock, and elsewhere in the County Galway, flying about a species of *Gnaphalium* on dry banks near bogs. The insect is widely distributed on the Continent, and it is somewhat remarkable that it has not yet been discovered in Great Britain. I think that the occurrence of so interesting a novelty in Ireland should be recorded at once in the Magazine conducted in Dublin, and beg therefore to forward this note at the same time as I record the discovery in the *Entomologists' Monthly Magazine*.

FURTHER OBSERVATIONS ON THE DEVELOPMENT
OF MELANISM IN MOTHs.

BY W. F. DE V. KANE, M.A., F.E.S.

I DESIRE to record a further corroboration of the arguments contained in my paper dealing with the remarkable instance of melanism in *Camptogramma bilineata* (*Irish Nat.*, vol. v., p. 74.) I referred therein to three examples of *Dianthæcia capsophila* taken on the same island off the Kerry coast, in which I discovered the variety *isolata* of the former insect, and stated that they also showed remarkable melanic tendencies. I desire now to record my success in breeding this summer seven examples of *D. capsophila* from larvæ there found. They all are melanic also, one specimen especially being almost a unicolorous black, the hind wings somewhat paler at base. On the fore wings can be distinguished only partial traces of outlines round the stigmata, one or two minute dots on the costa, one on the inner margin, and the chequers of the fringe. It is, therefore, evident that, as I pointed out in the paper above referred to, the local environments other than climatic conditions (which are the same as those of the mainland a few miles distant) have influenced this noctuid as well as the geometer. And as I have bred specimens of *D. capsophila* from other islands off the Irish coast—namely, from Inishmore (Aran), and one situated opposite Renvyle, Connemara, which are not melanic, it results that some especial peculiarity attaches to the rock-island in question off Kerry. As I have already discussed this, it is not necessary to enter upon it again.

A FRENCH TRAVELLER IN IRELAND.

Irlande et Cavernes Anglaises. Par E. A. MARTEL. Paris, 1897.
(Librairie Ch. Delagrave.)

THIS book is the outcome of the travels of its accomplished author during the summer of 1895. He states that he has been induced to write it, firstly by the successful issue of his explorations of the caves, and secondly, because of the "admiration and interest which the natural beauties of Ireland and its archæological treasures, both too little known by travellers" have given him. "Ireland," he says, "has been called the land of the Great Elk, and of the Giant's Causeway," thus defining it by its two principal scientific curiosities: the majestic fossil deer, and the marvellous basaltic columns of the County Antrim. "But," he continues, "the definition is incomplete: Ireland is also the country of unequalled sea-cliffs, of charming lakes with hundreds of islets, of mysterious subterranean rivers; of unexplained cromlechs and enigmatic round-towers, of enchanting and luxuriant parks and scenery, of heathen legends, mystical beliefs, and heroic traditions!"

It will be seen from these quotations that Monsieur Martel has carried away from his stay among us a rose-coloured impression of the country. Of the state of the people his conclusions are as cheerful. He deprecates the importance which former writers, especially Mlle. de Bovet, in her "Trois Mois en Irlande," have given to the political contests and disorders of the time. He finds everywhere he went, "the aspect of the country, the animals and the people much less miserable than I had expected; innkeepers and drivers, fishermen and farmers, barge-men and labourers, all owned that for the past five or six years a universal reaction from the former state of misery had set in to relieve everyone." He proceeds to say that he does not wish to attempt to estimate the reasons for, or the extent of the change—he merely wishes to state its effect on the pleasure of the tourist. "Whatever may be said of the beggars, they are less persecuting than in too-hackneyed Italy—the reception met with everywhere is more affable, the good humour and native cordiality of the worthy Irish make them eminently sympathetic; the hotels of the larger towns, and those of the Causeway, Kilkee, Killarney, etc., lack nothing of the comfort and excel in charming simplicity those of Switzerland," and even in the remote villages where the search for unknown caves led him, "the inns were such as would be commended in Dalmatia and in Greece, or even (must it be owned?) in many of the chief cantonal towns of the Cevennes or Dauphiné."

After this handsome testimony to the charms of travel in Ireland, Monsieur Martel describes the exploration of the Marble Arch cave in Enniskillen. He had here the assistance of Mr. Jameson, who had been deputed by the Fauna and Flora Committee of the Royal Irish Academy to accompany him. The curious underground river was explored by

means of a portable boat. It was found to be closed by the rock descending to or below the surface, causing siphons whence the waters emerge. The plan of the different galleries and passages is most complicated. The connection between two of them was discovered by the finding on the sand of the riverside in one passage of a little wooden collecting-box dropped by Mr. Jameson some days before in another cave.

After several days spent here, Monsieur Martel explored Arch cave, and then proceeded to the North and West of Ireland. We have not space to follow his travels nor his appreciative notices of the interesting archaeological remains of Clonmacnois, the Aran Islands, and the Rock of Cashel, which latter he describes as one of the principal curiosities, not only of Ireland, but of Europe. Nor can we do more than mention his enthusiastic admiration for Killarney, which, he tells, will more than bear comparison with the most renowned beauty-spots of Europe.

In the immediate neighbourhood of Dublin he finds much of interest and beauty. Especially he was interested in the wonderful tumuli of New Grange and Dowth, and in the remarkable discoveries which Mr. Coffey has made in them. He adds that it is impossible to avoid being impressed by the analogies of construction between these remains and those of Troy and Mycenæ.

The illustrations are not the least of the attractions of this appreciative and entertaining book. Taken in great part from photographs, they have been selected with care, and show many varied aspects of the scenery and ruins of Ireland. Some have been supplied by Mr. Welch, who has done so much to add to our knowledge of picturesque Ireland.

We can strongly recommend this book not only to intending tourists but to Irish people in general, and particularly to the Irish Tourists' Association, an account of the formation of which is given on page 11. A description of some of the English caves concludes the volume.

R. F. S.

PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts comprise a Hooded Crow from Mr. Herbert Brown, two Capuchin Monkeys and four Ringed Snakes from Judge Boyd, a Barn Owl from Mr. H. Freith, a Pheasant from Mr. B. Ireland, and a monkey from Dr. Joy. Two Lion cubs were born in the Gardens on December 16th, and five Cape Hunting Dogs on January 4th. A Teguixin and a pair of Shovellers have been acquired by purchase.

3,380 persons visited the Gardens during December.

DUBLIN MICROSCOPICAL CLUB.

NOVEMBER 19.—The Club met at the house of Mr. G. H. CARPENTER, who showed specimens of the larva of the dipteron *Simulium*, taken at Carton, Maynooth. These highly interesting aquatic larvæ are fully described by Prof. Miali in his recent book on the "Natural History of Aquatic Insects." Fastened by a sucker at the hinder end of the body, they set up currents in the water and sweep food into their mouths by means of a pair of processes with long fringes situated on the head.

Prof. T. JOHNSON showed a preparation of a microscopic green disc-like alga, *Pringsheimia scutata*, Rke., which is found as an epiphyte on *Polysiphonia*, *Zostera*, and other marine plants. It is closely related to *Mycoides parasitica*, which causes a coffee disease, and to *Phycopeltis*, of which Mr. Jennings recently described two new species before the Royal Irish Academy. *P. scutata* was added to the list of Irish marine algaæ on the B.N.F.C. dredging excursion in July last in Belfast Bay, and is recorded by Miss Hensman and the writer in the *Irish Naturalist* for October, 1896.

Mr. GREENWOOD PIM showed a remarkable mould parasitic on leaves of Rape, sent him by Rev. Canon Russell from near Tullamore. It belongs to the genus *Ramularia*. Mr. Massee of Kew, to whom specimens were submitted, writes that he had no hesitation in stating it to be a typical *Ramularia*—but undescribed specifically. It is intended to publish a description of it in an early number of the *Journal of Botany*, under the name of *Ramularia rapae*.

Mr. MCARDLE exhibited a specimen of *Lepidozia setacea*, Web. (Lindberg), bearing perianths on short lateral branches. The plant, though widely distributed in Ireland, is remarkable in the form of its leaves, which are transversely placed on the stem and divided into two or three setaceous segments, incurved and jointed by transverse septa; those near the apex of a shoot become nearly verticillate, which gives the plant a remarkable appearance; in this way it approaches closely one other Liverwort, *Blepharostoma trichophylla*, Linn. (Dumort). Sir Wm. Hooker states in his "British Jungermanniæ" that the resemblance of these two plants when under the microscope to *Confervaria verticillata* is worthy of remark.

Mr. R. J. MITCHELL showed several photo-micrographs of sections of rocks and plant-stems.

Rev. CANON RUSSELL exhibited the wing of a Chalcid-fly, and called attention to four rings set in the fork of the stigma in which an offshoot from the subcostal vein terminates. These discs, so far as he can learn, have not been noticed heretofore. A fine nerve was observed passing near or through one or more of these rings, which the exhibitor believes may be traced all along the subcostal vein, to a row (or rows) of oval or round vesicles at the base of the wing, closely resembling the so-called otoconia or otoliths found in the halteres of the diptera. Mr. Russell showed a sketch from the pen of a correspondent of a balancer of *Sarcophaga carnaria*, in which a similar arrangement is apparent.

Whether these bodies are organs of smell or sound, Mr. Russell leaves to the judgment of those who know more about the matter than he does, to decide.

DECEMBER 17th.—The Club met at the house of DR. MCWEENEY, who showed Widal's method of diagnosing typhoid fever. The blood or serum of the patient is mingled with a pure living cultivation of *Bacillus typhosus*. Should the case be one of typhoid the bacilli quickly lose their motility and become agglomerated. If the disease be other than typhoid, or should the blood be derived from a healthy person, the active movements of the bacilli are not interfered with and agglutination does not occur. Bacilli other than typhoid fail to give the reaction with typhoid blood. These points were successively demonstrated by means of serum of a typhoid patient contained in a capillary tube and cultures of *B. typhosus* and *B. pyocyaneus* in broth. The test seemed likely to become one of the most valuable methods of diagnosing typhoid.

Prof. COLE showed a rock-section given to him by Prof. J. W. Judd, cut from a specimen collected on Rockall by Capt. Hoskyns in 1863. The rock from this remote Atlantic islet was described by Prof. Judd in a paper read before the Royal Irish Academy in November, 1896.

Mr. GREENWOOD PIM showed an alga, *Nodularia Harveyana*, growing on a living and healthy palm leaf in the Trinity College Gardens. The very unusual nidus and the velvety appearance to the naked eye induced the exhibitor at first to regard it as a black mould resembling *Sporoschisma*.

Prof. T. JOHNSON showed a preparation of *Monoblepharis insignis*, R. Thaxter, an aquatic fungus found by Prof. Thaxter, to whom the exhibitor was indebted for the slide, on submerged twigs in ponds and ditches in Massachusetts and Maine. *Monoblepharis* is remarkable as being the only fungus possessing motile male organs or antherozoids, uniciliate and half the size of the biciliate zoospores. Thaxter's illustrations (*Botanical Gazette*, 8th Oct., 1895), were shown. *Monoblepharis* is allied to the genus *Saprolegnia*, one species of which is the salmon-disease fungus.

Mr. MCARDLE exhibited a specimen of *Lejeunea Holtii*, Spruce, which was gathered on shady rocks below Torc Waterfall, Killarney, by Mr. G. A. Holt, of Manchester, in 1885. The plant resembles *L. flava*, Swartz, but differs from every other European *Lejeunea* in the perianths being borne on short branchlets which normally put forth no sub-floral innovations, such as more or less exist in all our other species. The specimen exhibited showed perianths; and the pale reddish tinge of the foliage, which is remarkable, and is not seen in any other species, was to be observed. The re-discovery would be of interest and botanical importance; it has not been found amongst the numerous gatherings made by Mr. McArdle, or by any person that he is aware of, since 1885.

Dr. C. HERBERT HURST exhibited preparations illustrating the structure of the larval gnat.

Mr. A. VAUGHAN JENNINGS showed a preparation made by Mr. Coppen Jones, F.L.S., of Davos Platz, showing the branched or mycelial stage of the organism causing tuberculosis. It is now being recognized by bacteriologists that the so-called Tubercle Bacillus may be only a stage

in the life-history of some higher fungus, probably related to *Actinomyces*, and Mr. Jones' investigations and preparations seem to place the matter beyond doubt.

Mr. Jennings also exhibited a new genus of Bacteria of remarkable stellate form, probably related to the *Pasteuria* of Metschnikoff.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

JANUARY 5.—Mr. L. L. Macassey, B.L., read a paper entitled "A Run through the Mourne Mountains." It was illustrated with a fine series of photo slides, by Mr. R. Welch.

BELFAST NATURALISTS' FIELD CLUB.

NOVEMBER 26.—The Geological section met, the principal attraction being a fine collection of Vesuvian lavas, recently presented to the Natural History and Philosophical Society, who kindly lent them for the occasion. Various forms of flint were also shown by G. M'Lean. The honorary secretary exhibited a specimen from near Annalong of that rare rock variolite, presented by Professor Cole, who recently rediscovered this very obscure dyke; also a copy of the new index-map of the Geological Survey of Ireland, received on behalf of the Club from Mr. Nolan, who had kindly coloured it by hand. A boulder of the famous Shap granite found in glacial drift in Yorkshire, obtained from Mr. Platnauer, of York Museum, by Miss M. K. Andrews (who also presented some Isle of Man rocks), was presented; also specimens from Messrs. R. Bell and G. M'Lean. Mr. L. M. Bell exhibited and presented very fine examples of eurite, intruding in masses and veins into Ordovician rocks, from Newcastle Waterworks. A letter from the chairman of the Botanical section (Rev. C. H. Waddell), suggesting a joint meeting of the sections later in the season, was read and approved. The desirability of acquiring apparatus for rock-slicing was also discussed, and a subscription started for the purpose.

DECEMBER 26.—The geological section had a successful excursion to Dromore. Rev. David Thompson met them on arrival, and conducted them to the cathedral, and to the fine old cross, which was successfully restored some years ago. A fine section of boulder clay in a brickfield shows a lower layer of tough blue clay, capped by an almost equal depth of red clay. Special interest attached to the question whether this difference in colour indicated two different periods of deposition, but the conclusion arrived at was that there was no proof of such unconformability, the difference in colour being probably due to oxidation of the upper layer. Erratics from Ailsa Craig, Cushendall, and other distant localities, occur in the section. The splendid fort, finely placed in a protecting bend of the Lagan, was visited in a storm of wind and misty rain.

The section met again at the Museum on 31st inst., when Mr. W. J. Fennell showed some excellent photographs made at Dromore. Mr. R. Bell exhibited part of a fossil crab from the chloritic sands of Colin Glen, and ripple-marked Trias from Crow Glen; Mr. A. G. Wilson, granites from Slieve Gallion (Derry), and Galway.

Prof. Sollas' paper and map of the eskers of Ireland was exhibited by the honorary secretary. Mr. G. MacLean presented specimens of steatite and lithomarge to the section. The suggestion that Professor Cole should again be invited to hold a class in Belfast in spring was cordially welcomed, and the secretary instructed to communicate with him as to possible arrangements. After devoting half an hour to determining the specific gravity of some rocks, the meeting terminated.

DUBLIN NATURALISTS' FIELD CLUB.

DECEMBER 8.—The PRESIDENT in the Chair. The minutes having been read, the President called for nominations of officers and committee for 1897, and read the following list of nominations made by the committee:—President, Prof. G. A. J. Cole; Vice-President, R. Lloyd Praeger; Secretary, Prof T. Johnson; Treasurer, H. H. G. Cuthbert; Committee, G. H. Carpenter, J. J. Dowling, Rev. T. B. Gibson, Miss Hensman, C. H. Hirst, Miss Kelsall, E. J. McWeeney, R. J. Mitchell, G. Pim, H. J. Seymour, Miss Singleton, Mrs. Tatlow.

Rev. MAXWELL H. CLOSE read a paper "On the Former Abundance of Granite Boulders in the Killiney District and elsewhere," which appears in our present issue.

Rev. W. S. GREEN, M.A., Inspector of Fisheries, exhibited a series of lantern-slides of photographs taken on the expedition sent out last June to explore the vicinity of the islet of Rockall, in the North-east Atlantic, and briefly described the experiences of the party and the results of their cruise. The PRESIDENT added some information relative to the geology of the Rockall plateau, and Mr. Praeger, as a member of the expedition, made a few remarks.

Mr. GREENWOOD PIM exhibited the "Animated Oat" *Avena sterilis*, which possesses long kneed twisted awns, which are very sensitive to moisture, and by their twisting and untwisting force the seed into the ground. He also exhibited a new fungus disease of the Rape (*Ramularia* sp.), which will shortly be named and described.

Mr. PRAEGER showed some rare Irish flowering plants collected in 1896, an account of which will appear in these pages.

The PRESIDENT announced that the Committee had had before them the question of the proposed closing of the Giants' Causeway, and had decided to open a subscription list in aid of the Defence Fund, and that contributions would be received at this and subsequent meetings. A number of members entered their names on the list during the evening.

JANUARY 12.—The Annual General Meeting was held, the President (Prof. Cole) in the chair. The minutes of the previous meeting having been read and signed, the Secretary (Mr. Praeger) read the annual report of the Committee, of which the following is an abstract:—the membership stands at 200, 23 new members having been elected during the year, and 17 struck off. Five winter meetings were held, and were well attended; in addition a successful conversazione took place at the opening of the Winter Session. The seven summer excursions arranged by the Committee were all carried out satisfactorily. The best thanks of the Club are due to Count Considine, Mr. Samuel Jones (Cavan), and Mr. J. G. Nutting, for facilities rendered on these excursions. The inter-Club work, for the development of which the Irish Field Club Union was founded, has been steadily carried on. The Committee charged with the investigation of the cryptogamic flora of Dublin and Wicklow report that progress is being made. The Committee of the Club recommend a grant of £10 to the Editors of the *Irish Naturalist*, and another at the rate of 2d. per head on the Club membership to the Field Club Union Committee, to assist in defraying the expenses of the year 1896. The best thanks of the Committee are due to the Council of the Royal Irish Academy for continued permission to hold the Club meetings in their rooms. The Committee have opened a Club subscription-list in connection with the Giant's Causeway Defence Fund.

Prof. Johnson then submitted his report and statement of account as Treasurer, which showed a balance of £37 18s. 11d. in the Club's favour. The adoption of the report and accounts was moved by Mr. A. Shackleton, seconded by Mr. J. E. Palmer, and passed after a discussion, and resolution referring to the Committee the drafting of a rule on the subject of new members depositing their entrance-fee prior to election. The Chairman declared the following office-bearers for 1897 elected according to the rules:—President, Prof. G. A. J. Cole, F.G.S.; Vice-President, R. Lloyd Praeger, B.A., B.E.; Secretary, Prof. T. Johnson, D.Sc., F.L.S.; Treasurer, H. Gore Cuthbert; Committee, G. H. Carpenter, B.Sc., J. J. Dowling, Rev. T. B. Gibson, M.A., Miss Hensman, C. H. Hurst, Miss E. J. Kelsall, E. J. M'Weney, M.D., R. J. Mitchell, Greenwood Pim, M.A., H. J. Seymour, Miss Singleton, Mrs. J. T. Tatlow. A grant of £10 to the Editor of the *Irish Naturalist*, as recommended in the report, was proposed by Prof. Johnson, seconded by Miss Kelsall, supported by Mr. A. Shackleton, and passed; as was also the grant recommended to the Field Club Union, on the motion of Dr. Hurst, seconded by Mr. J. F. Shackleton. On the motion of Mr. J. J. Dowling, seconded by Mrs. Ross, the best thanks of the Club were voted to the Council of the Royal Irish Academy, for their courtesy in allowing the Club to meet in their rooms during the year. A vote of thanks to the press for regularly reporting the proceedings of the Club was passed at the motion of Miss M'Intosh, seconded by Mr. A. Roycroft. Miss M. F. Johnson, Miss S. Paxton, and Miss E. Paxton, were elected members of the Club.

A discussion ensued relative to places to be visited during the coming summer, and other matters. Dr. Hurst stated that he was authorised by

Prof. Herdman, President of the Liverpool Marine Biological Association, to invite members to join that Society's Easter trip to Port Erin, Isle of Man.

LIMERICK NATURALISTS' FIELD CLUB.

JANUARY 14.—The fourth annual meeting of the Limerick Naturalists' Field Club was held in the Board-room of the Savings Bank. The attendance was very large, the Board-room being inconveniently over crowded. Mr. Archibald Murray, President of the Club, occupied the chair.

The Chairman having opened the proceedings,

Mr. Neale, Hon. Secretary, read the annual report, of which the following is an abstract:—

The Committee are pleased to be able to state that the record has been one of unbroken progress, not only in numbers, so far as the increase of mere membership is concerned, but also in the increased interest taken in its working, both as to meetings and excursions. This has been proved in regard to the former by the response to the proposal that a course of botanical lectures would be carried out in the now current session, should a sufficient number be found willing to attend them. No less than fifty entered their names within ten days after the announcement had been made, and almost four-fifths of these have attended the lectures held up to the present.

The excursions of the Club during 1896 were successful, and the four carried out were well attended. The wet weather of the latter part of the summer and autumn compelled the abandonment of the other two, much to the regret of all concerned. The thanks of the Club are due to E. J. Phelps, Esq., of Waterpark, Castleconnell, for his invitation to provide tea at Doon Island wood. The meetings and excursions of the Club during 1896 were—January 23rd, Annual Meeting; February 18th, adjournment of same; March 3rd, Photomicrographic Demonstration, with hints on slide making, by Drs. W. A. and G. Fogerty; March 24th, Microscopic Fungi, by Mr. W. Thorp; April 14th, Lantern Exhibition by the Photo Section; November 17th, Butterflies, how and where to find them, by Mr. F. Neale; December 11th, Irish Animals, old and new, by Mr. G. H. Carpenter. Excursions—May 14th, Caherconlish—Ahern's Carboniferous Limestone Quarry, the Demesne, and the Porphyritic Basalt exposure in the vicinity; June 11th, Iniscaltra, or Holy Island, Lough Derg; July 15th, Ciamaltha, or Keeper Hill, Co. Tipperary; July, 31st, Glenomera Wood and Valley, Co. Clare.

It is a matter for regret that we cannot yet say much actual field work has been done by our members in any department of natural science, the only botanical record of interest reported during the year being the occurrence of Viper's Bugloss (*Echium vulgare*) found growing on the railway line near Foynes by Mr. R. D. O'Brien. In ornithological matters it may be well to note that the Nightjar was comparatively

abundant on the higher edges of Cratloe wood last summer, and that an albino example of the Common Swallow was taken near Croom. A new Irish insect has again been added to the list by your Secretary, who, in July, in Cratloe wood, took several examples of an interesting long-horned arboreal orthopteron, known to science as *Meconema varia*, a very beautiful little creature of the grasshopper tribe, whose life appears to be spent in the pupa and imago stages, amongst the oak-trees of such woods as it frequents. The discovery of the ground-beetle *Panagaeus crux-major*, which was reported in 1895 as having been taken at Finlough, Co. Clare, and made such a stir as a Germanic insect hitherto confined to the S.E. of England, has again been taken at same place in fair abundance, thus demonstrating that it may be looked upon as a resident, and not a straggling casual or erratic member of the genus, which had lost its way, as the single specimen of 1895 was supposed to be. A future is apparently before the Photographic Section of the Club, which was only established in February last. It has already good work to show.

The year has witnessed a gain in membership of 60. Starting a year ago with 50, there were on the 31st December last 110 names on the list. Some mention has been made from time to time as to opening an Archaeological section, but no decision has so far been come to. A suitable place of meeting has been a matter demanding the serious attention of the Committee during the year, and an arrangement has been made with the Trustees of the Savings Bank for the use of its board-room. The hearty thanks of the Club are due to the Committee of the Free Library for so kindly placing the use of its board-room, with gas, etc., at our disposal throughout the year and entirely free of charge.

The report was put and adopted.

Mr. Joseph Stewart, Treasurer, submitted the balance sheet, which was considered satisfactory, there being at present a credit balance of £7 17s. 5d. He moved that the financial statement be adopted.

Mr. Neale seconded the resolution, which was passed unanimously.

The Secretary nominated Dr. W. A. Fogerty as President for 1897, Mr. J. Greene Barry and Mr. B. Barrington as Vice-Presidents; Treasurer, Mr. Joseph Stewart; Committee, Miss Ebrill, Mrs. R. Gibson, Mr. R. D. O'Brien, Mr. P. O'Meehan, Mr. E. Taylor; Secretary of the Photographic Section, Dr. George Fogerty; and General Secretary, Mr. F. Neale. These gentlemen had been recommended by the last meeting of the Club.

The appointments as proposed were made unanimously.

Mr. Barry proposed a resolution connected with an Antiquarian section, as follows:—"That it is desirable to have an Antiquarian section in connection with this Club, and that the same be, and is hereby, established."

Mr. James Frost, J.P., seconded the proposition.

The resolution was passed unanimously.

This closed the ordinary business, and a magic-lantern display followed of photographic views taken by members of the Club, amongst whom were—Mr. F. B. Angle, Canon Hadyn, Mr. Griffith, Mr. Webb, Miss Bennis, Mr. Sams, Mr. Fogerty, Mr. B. Barrington, Miss Ebrill, Miss

Evans, Mr. Joseph Stewart, and Mr. Parker. Besides these, several photos by non-members were exhibited. Mr. R. Welch, of the Belfast Naturalists' Field Club, sent some photos of wild-flowers in their natural position, birds' nests, geological slides, and antiquarian remains.

The exhibits in the body of the room were as follow:—Natural History Exhibits—Birds, shells, fishes, insects, fossils, seaweeds, and dried plants; snakes, scorpions, etc., in spirit; skull of *Bos longifrons*, etc., etc. Irish Antiquities—Stone and bronze implements, celts, coins, ornaments, etc. Photo-micrographic apparatus, with prints and transparencies of botanical, zoological, and other subjects. Photographic Prints—Rock formations, sections, outcrops, etc.; also scenery, antiquities, animals, etc., etc.

In another part of the building, Dr. Laird explained the powers of the Röntgen Rays. During the evening a musical programme was gone through under the conductorship of Mr. Kendal Irwin, Mrs. Fogerty, and some other ladies and gentlemen kindly assisting.

FIELD CLUB NEWS.

On another page we publish a report of the Annual Meeting of the Limerick Club, which took place on 14th inst. The success of this meeting affords a striking proof of the rapidly-increasing popularity of this, the youngest, of the Irish Field Clubs. During the year the membership has risen by over 100 per cent., and on the present occasion the large attendance taxed to the utmost the capacity of the fine board-room of the Savings Bank, where the meeting was held.

At the Annual Meeting of the Dublin Club, held on January 12, Dr. Hurst stated that he was authorised by Prof. Herdman, President of the Liverpool Biological Association, to invite members of the Club to take part in the Association's Easter excursion to Port Erin, Isle of Man. This is an excellent opportunity for students of Marine Biology. We feel sure that Prof. Herdman would extend the invitation to the Belfast Club, should any of the northern members wish to avail themselves of it.

Miss Thompson, Secretary of the Geological Section of the Belfast Club, writes:—

The Club has frequently had reason to acknowledge gratefully much kind assistance from the officers of the Geological Survey of Ireland. Since the formation of the Geological Section of the Club in 1893, Mr. M'Henry has rendered invaluable assistance by undertaking the laborious task of inspecting all unknown erratics and naming their place of origin, for publication in the Annual Report. A copy of the new Index map just published by the Survey has been presented to the Club by Mr. Nolan, who has furthermore coloured the divisions included in each memoir, which greatly enhances its value for rapid reference.

On December 10th and 11th, Mr. G. H. Carpenter, B.Sc. lectured, as delegate from the Dublin Club, before the Clubs of Cork and Limerick on the subject of "Irish Animals, Old and New." In Limerick the meeting was held in the Town Hall, in Cork in the ball-room of the Imperial Hotel, and there was a large audience at both places.

The Limerick Club has just inaugurated a course of lectures on botany by Dr. W. A. Fogerty which promises to be highly successful. The number of applicants for tickets was almost inconveniently large, and if supplemented by field work in the spring, the course should be of much service in arousing interest in the as yet imperfectly known flora of the district.

The Cork Club also propose to hold courses of lectures early next year. Miss Martin has undertaken a botanical series, while the secretary, Mr. J. L. Copeman, will contribute discourses on insects.

It is very desirable that our Clubs should possess herbariums easily available, for purposes of study or comparison, to all their members. The nucleus of such a collection was recently presented to the Belfast Club by Miss S. M. Thompson, to whom it was originally given by the late Mr. William Darragh, Curator of the Belfast Museum. The Collection comprises 433 species, and was made by his son, Mr. John Darragh, one of the original members of the Club, during the year ending March, 1865. It has therefore a certain historical interest, dating from the second year of the Club's existence, when the presence and teaching of Prof. Ralph Tate had aroused such a keen interest in the study of natural history about Belfast—an interest which resulted in the establishment of the first Irish Field Club. The practical value of such a collection is shown by the constant reference made to it during the monthly botanical meetings organized by the Rev. C. H. Waddell.

N O T E S.

BOTANY.

PHANEROGAMS.

Euphrasia Salisburgensis, Funk, in Co. Galway.

In August, 1892, while botanising in the rough limestone country by the south-eastern shore of Lough Corrib, near the little village of Menlough, we noticed a curious-looking *Euphrasia*, and collected a few specimens of it. These were sorted away and forgotten until recently, when having occasion to turn through our *Euphrasia* cover, we were struck by their resemblance to Mr. Townsend's figure and description of *E. Salisburgensis* in the November number of the *Journal of Botany*. We have forwarded specimens to Mr. Townsend, who writes:—"they are more typical than the Mayo plant gathered by Mr. Marshall, bracts narrower, teeth longer, more patent and aristate. The finding of this species in another county is a very valuable confirmation of *Euphrasia Salisburgensis*, Funk, being a native of Ireland."

H. & J. GROVES.

ZOOLOGY.

Distribution of British Marine Plankton.

Many of the organisms commonly found in the plankton of the sea around the British Coast exhibit remarkable variations in their relative abundance at particular localities from year to year, but little is known as to the extent and causes of such variations. As a number of naturalists make use of the tow-net at many places around the coast, especially during the summer, much valuable information would be obtained, if in all cases records were kept of the presence or absence of a limited number of the commoner species, and these records subsequently brought together.

In the hope that Irish naturalists may be willing to assist in obtaining such information, I send a short list of organisms, the presence or absence of which I would ask to have recorded at any locality and as often as the tow-net may be used during the year 1897. *Halosphera viridis*, *Noctiluca miliaris*, *Aurelia aurita* (including *Ephyra*), *Agalmopsis*, *Muggiea atlantica*, *Hormiphora plumosa*, *Beroe*, *Tomopteris*, *Anomalocera Patersoni*, *Doliolum*, *Salpa*. Where the generic name only is given in the above list, the specific name of the specimens taken should be added. Should any doubt exist, preserved specimens should be kept.

In making a record the following should be stated:—DATE; HOUR; LOCALITY. (With as much accuracy as possible). DEPTH. (depth of water and maximum depth at which net has been worked); QUANTITY—(0. Absent; 1. Few only; 2. Moderately plentiful; 3. Exceptionally abundant.) Observations on the temperature of the sea, and notes on wind, tide, &c., will also be of value. Records should be sent in before January 31st, 1898, or forwarded from time to time to me at the Marine Biological Association, Plymouth.

E. J. ALLEN.

INSECTS.

Entomological Notes.

COLEOPTERA.—In the canal between Poyntzpass and Scarva I met with *Coelambus v.-lineatus*, *Noterus clavicornis* and *Ilybius fuliginosus*. A young friend brought me some beetles which he had captured at Portrush in August last, among these were *Amara fulva*, *A. bifrons* and *A. ovata*; *Anchomenus dorsalis*, *Calathus micropterus*, *Bembidium rufescens*, *B. saxatile*, *Cercyon littoralis*, *Ocypus morio*, *O. cupreus*, *Xantholinus glabratus*, *X. distans*, *Necrodes littoralis* (a small form), *Geotrupes vernalis* and *Otiorrhynchus atroapterus*. The specimens had all been picked up on the sand-hills. Mrs. Johnson brought me a few beetles from the sand-hills at Newcastle, Co. Down. Her opportunities for collecting were unfortunately limited and she got but few; the following were her captures:—*Broscus cephalotes*, *Calathus fuscus*, *Bembidium littorale*, *Coccinella xi.-punctata*, *Aphodius scybalarius* and *Otiorrhynchus nuscorum*.

In moss from my own fields I took *Pterostichus versicolor*, *Anchomenus dorsalis*, *Bembidium obtusum*, *Quedius fuliginosus*, *Q. molochinus*, *Q. rufipes*, *Philonthus intermedius*, *Stenus speculator*, *S. latifrons*, *Scydmanus collaris*, *Anisotoma calcarata*, *Atomaria basalis*, *Longitarsus melanocephalus*, De G., *Psylliodes napi*, *Apteropoda orbiculata*, *Cassida flaveola*, *Apion dichroum*, *Otiorrhinchus schönherrii*, *Hypera punctata*, *H. polygoni*, *Sitones suturalis*, &c.

HEMIPTERA.—I have made but few captures in the order and none of special note; the following are all I can record:—*Tropicoris rufipes*, *Stygnus rusticus*, *S. arenarius* and *Miris calcaratus*.

HYMENOPTERA—In this immediate neighbourhood in addition to those mentioned in my last note (*Irish Nat.*, vol. v., p. 273), I have met with *Halictus cylindricus* making its burrows in a bank near a small lake, *Megachile centuncularis* hard at work on rose-leaves in my garden, *Myrmica sulcinodis* in moss. On Bray Head in August I met with a working *Bombus venustus* on heather, and while clambering along the cliff captured a number of *Vespa germanica* which were evidently attracted by honey-dew on the leaves of the Coltsfoot, for I was able to box them with but little difficulty, and those which I saw to be *V. vulgaris*, and consequently rejected, frequently fell down to the ground as if stupefied by what they were imbibing. In the same locality I took *Lasius flavus*, *Formica fusca* and *Leptothorax acervorum*. I had no net with me, being only on a hurried visit, or I might have obtained other specimens.

LEPIDOPTERA—Sugar proved an utter failure, for scarcely any moths came to it, and those of the commonest description.—In my own dairy I took a nice *Crocallis elinguaria*, and on the way to Loughbrickland captured it again and a specimen of *Hyponomeuta cagnagellus*. In the grounds here, I captured *Triphana comes*, a nice red form; these were taken in July. August and September were practically a blank owing to the very wet weather. Since then my only capture has been *Cheimatobia brumata*, which was very plentiful in November.

W. F. JOHNSON.

Coleoptera taken at Tempo, Enniskillen.

During the spring and summer of 1896 I secured a number of beetles, mostly by sweeping in a marshy meadow. A few were found under stones, bark, &c., and some among moss. I have to thank Mr. Halbert for kindly identifying most of them for me, and I have furnished him with a list of the species taken (about 200 species) for use in compiling the Catalogue of Irish beetles on which he is engaged in collaboration with Rev. W. F. Johnson and Mr. Carpenter. The following are among the scarcer and more noteworthy species:—*Carabus monilis*, *Pelophila borealis*, *Coelambus quinquelineatus*, *Tachyporus obtusus*, var. *nitidicollis*, *Leistotrophus nebulosus*, *Baptolinus alternans*, *Olophrum piccum*, *Necrodes littoralis*, *Halcyzia conglobata*, *Rhizophagus dispar*, *Dermestes lardarius*, *Geotrupes vernalis*, *Telephorus nigricans*, *T. paludosus*, *Ptilinus pectinicornis*, *Chrysomela fastuosa*, *Deporaus betulae*, *Phyllobius argentatus*, *P. pomonae*, *Barynotus Schonherrii*, *Hylobius abietis*, *Grypidius equiseti*, *Erirrhinus aethiops*, *Dorytomus maculatus*.

C. LANGHAM.

Tachypus pallipes, a Beetle new to Ireland.

I may mention that in June last, at Coolmore, Co. Donegal, I took this species, which I believe to be new to Ireland, in numbers.

C. LANGHAM.

AMPHIBIANS.**Is the Frog a native of Ireland?**

We are gradually becoming better acquainted with the early history of the Frog in Ireland. Mr. de V. Kane's note in last month's *Irish Naturalist*, containing an additional, though somewhat vague, record of the introduction of the Frog into this country, is very interesting. But as I have shown before, the fact of any one introducing an animal into a country, does not necessarily prove that the same kind of animal did not previously exist there. Many people at the present moment would deny that the freshwater crayfish inhabits Ireland, if they were shown one, but nevertheless, that animal is common enough in brooks and rivers in most parts of the country. Their denying the existence of the species therefore only proves their ignorance—nothing more. Moreover, even Saint Donatus's graphic description of Ireland on which we mainly found our belief in the former absence of the Frog can be interpreted in two ways. "Nec conquesta canit garrula rana lacu" which might be translated by "no noisy frog croaks in the lake," may merely indicate that Saint Donatus, not being accustomed to be annoyed by *noisy* frogs in his native Ireland, was particularly struck by the very different habit of the Italian Frog. The Irish Frog is silent—even during the breeding season it calls to its mate in a scarcely audible voice, whilst the common Italian Frog, which belongs to a different species, makes the air in the evening loudly ring with a tremendous uproar. Hence when Laurenti first described the two species of frogs, he called the Irish Frog, which of course also occurs on the Continent, *Rana muta*—the *mute* Frog.

R. F. SCHARFF.

BIRDS.**The Carrion Crow (*Corvus corone*) in Ireland.**

In the *Irish Naturalist* of last December, Mr. Standen drew attention to the occurrence in the North of Ireland of the Carrion Crow. I am glad to hear that the publication of this note has been productive of a more lively interest being taken in the Crow family. Through Mr. Ussher's efforts, the Dublin Museum has been enriched by an undoubtedly Irish specimen of the Black or Carrion Crow, Mr. Hardy, of the Manchester Museum, having kindly presented a specimen shot in 1863 in the Gap of Dunloe (Kerry).

Most people are aware, I think, that there are two kind of crows in the British Islands, and the Black Crow is common in England, but very rare in Ireland. The Grey or Hooded Crow is common in Ireland and rare in England. Many similar cases of distribution in two closely allied species are known to naturalists, not only in birds but in many groups of invertebrate animals. Their range suggests that perhaps a great interval of time elapsed between the original migrations to the British Islands of the two species. We might assume that the Grey Crow arrived first from the Continent and spread all over Great Britain and Ireland, and that the Black Crow has come more recently and supplanted the former in those parts nearest to the Continent. This supposition would explain the fact that in the more remote parts of the British Islands from the Continent, viz., in Ireland and Scotland, the Grey Crow is more abundant than the Black. It matters little whether we call the two crows races, varieties or species. Certain it is that the two forms present no structural differences, that their eggs are often undistinguishable, and that they frequently interbreed.

Young Rooks are often mistaken for Crows in Ireland and indeed they are very much alike, but Mr. R. M. Barrington pointed out to me that the bases of the body feathers are in the former always grey and in the latter white. We have therefore a very simple method by means of which these two species can at once be distinguished by merely lifting the feathers a little and examining their under parts.

R. F. SCHARFF.

Stock-dove at Drogheda.

On the evening of the 6th inst. I shot a Stock-dove at Blackhall, Drogheda. I have been looking out for them for many years, but never saw one before, though I have shot many hundreds of Ring-doves. It is a level and wooded locality, and about 20 miles from the place where Lord Clermont first saw the Stock-dove in 1875.

G. H. PENTLAND.

Surf Scoter in Killala Bay.

On the 19th inst. when punt-shooting near Killala, in the Moyne Channel, I met a pair of Surf Scoters; the female was secured, but the male, a fine adult bird, escaped with a broken wing. The bird obtained is only the fifth specimen as yet known to have been shot in Ireland. The first was shot in Belfast in 1846; the second at Clontarf, Co. Dublin, in October, 1880; and a third, a young female or male, shot in Crookhaven Harbour, Co. Cork, in November, 1888. While Mr. Sheridan, of Achill, Co. Mayo, speaks of shooting one there with a rifle bullet in 1870.

ROBERT WARREN.

[We hear that Mr. Warren has since shot the male, and that both birds have been secured for the Dublin Museum.—EDS.]

Fork-tailed Petrel on Lough Foyle.

My attention has been called to a note in the *Irish Naturalist* (vol. v., p. 320) in which my name appears as having shot a "Fork-tailed Petrel on the shores of Lough Foyle." That I shot such a bird is true, but the information given by the correspondent, Mr D. C. Campbell, is not strictly correct. As it would appear from his note that his information was supplied by me, I think it well to send this contradiction.

I am engaged in making a survey of Lough Foyle, and cover a distance of about 12 miles on the lough daily, hence I have most exceptional opportunity of observing the appearance of the various birds which frequent Lough Foyle.

CLAUDE W. BUCKLE.

*MAMMALS.***A Plague of Rats at Cushendun.**

These rodents have rapidly increased during the summer and autumn; every hedge-row is burrowed with them—hundreds have been killed, and still they are very numerous. The Stoats seem to have succumbed to some disease, as they were very numerous in the district; this may explain the multiplicity of rats. Starlings have also decreased for some reason.

SL. ARTHUR BRENAN.

*GEOLOGY.***The Kerry Bog Disaster.**

The recent disastrous bog-slide in Kerry has furnished an opportunity for the scientific investigation of these curious phenomena which has not been neglected. The Royal Dublin Society without loss of time appointed a Committee, consisting of Prof. Sollas, Mr. Praeger, Dr. Dixon, and Mr. Delap to investigate the circumstances of the outburst; their report was laid before the Society on January 19, and will be published shortly. Prof. Cole visited the spot as early as possible, and has published in *Nature* of January 16th his account of the disaster and its geological aspects. It is to be hoped that these reports may lead to a systematic investigation relating to the stability of bogs. Serious damage has on many occasions been done by bog-bursts in Ireland; and there can be no doubt that simple precautions properly applied would obviate the risk of further disasters of the kind.

FIELD DAYS IN ULSTER

BY THE REV. HILDERIC FRIEND.

I.—THE SLOBLANDS OF BELFAST.

DURING the Whitsuntide holidays of 1896 I spent ten days in the North of Ireland. My chief object was to discover fresh-water annelids, of which I felt convinced a large number of species yet remained unknown. My campaign was so far successful that I discovered a goodly number of species which have never yet been described by our authorities in this branch of science. I had, unfortunately, to remove from my old home in Cumberland just as I was in the midst of drawing and describing my specimens, and have only now been able to resume the study. I hope that the publication of these notes will lead a number of readers of the *Irish Naturalist* to do for the aquatic worms what they so readily and successfully did for the terrestrial species ; and if as many consignments reach me as I received in 1892-4, I shall doubtless be able this year to publish a very satisfactory list, and so bring up our knowledge of Irish annelids to the level of other countries. As my work last year was undertaken for the Royal Irish Academy, I do not in this preliminary report give any descriptions of new species, but simply place on record the work done, with a view to helping other workers who may wish to take up a subject which has not yet been exhausted.

I landed at Belfast just as the sun rose on Whit Tuesday, May 26th, 1896. For weeks there had been little or no rain, and while the dry weather with which I was favoured enabled me to get about with the greatest ease and comfort, it closed many possible hunting-grounds in the way of ditches and gutters, which in wet weather abound in annelids. I was fortunate in having Mr. Bigger as my patron, and he had secured the services of a gentleman who knew the locality thoroughly, and was not afraid to be seen grubbing in the ditches and pools. We proceeded during the forenoon to explore with great care the estuarine flats in the neighbourhood of the docks. For some time our labours were in vain. Not a trace could be found of anything in the shape of worms, and in fact every form of life seemed to be scarce. By dint of

careful and patient toil, however, we eventually coaxed from the "slob" land, as my companion termed it, some specimens. These included a *Planorbis* among the mollusca, the so-called horse-leech, three or four freshwater worms, together with *Allurus tetraedrus*, *Allolobophora chlorotica* (both type and variety), *A. turgida*, and *A. subrubicunda*. After a while we came down to the Connswater, where we made a splendid discovery. As I turned over the green seaweed which lay in considerable lumps on the stone-paved sides of this tidal stream, I found the stones in many places quite blood-red with minute worms. They were very healthy and active, but it was perfectly easy to secure a large "bag," and I took away as many specimens as I needed. Having placed some in spirits I endeavoured to keep the rest alive, as it is most desirable that every new species should be described from living material. I found, however, as I continued my stay in the country that the alga began to decompose, resulting in the death of my worms. I had consequently to throw away my collection from this locality, which I did without regret, because my guide had kindly promised me a fresh supply at any future time. I availed myself of his kind services after reaching home, and was well rewarded.

I may here remark that such localities as these are yielding most valuable results, because by their means we are able to derive information which is calculated to help in the solution of the problems connected with the distribution of annelids. We find that certain genera are semi-aquatic—capable of living either on land or in the water. Others we ascertain to be capable of existing either in fresh or brackish water; while we further learn that some genera which have representatives on the shores of our inland seas or fresh-water lochs, are also represented by other species on the sea-shore. There is a large and fascinating field for research here, and as Belfast is practically the only place in Ireland where I was able systematically to examine the slob-land, tidal streams, and estuarine flats, I am hoping that when correspondents send me gleanings from similar places in other parts of the country some very valuable discoveries may be made. It may be interesting, for example, to note that the annelid-fauna of the Solway yields a number of species which I did not find at Belfast, and *vice versa*; so

that at Castlebellingham, Bray, Cork, Kerry, and elsewhere, many new captures may be expected.

I must guard the collector against one or two possible sources of error. In the first place it must not be supposed that all the water-worms are red, brightly coloured, or easily detected. White worms abound in many places, and in fact the colour varies immensely; and in the next place let it not be supposed that no worms exist if they cannot be detected with the eye or even with a lens. I shall have to describe specimens taken at different places, the very existence of which I did not suspect until I had my material under the microscope.

On examining my Belfast specimens I found many things of interest; respecting which, one or two notes must for the present suffice.

Heterochaeta costata, Clap.

This interesting creature was found somewhat sparingly among the seaweed. As it has been fully described by others I shall only give my own observations, that the results may be compared or contrasted with those of others.¹ The worm is from half to three quarters of an inch in length, and of a greenish brown hue. It is remarkable for its fan-shaped setæ, which occur on segments v. to xii. or xiii. In the hinder segments about one forked seta in each bundle. I found as many as 70 segments in one worm; the body transparent, oesophagus with chloragogen cells, beginning in segment vi. A pair of enlarged vessels or hearts in viii. The amount of constriction and annulation varies. The system of blood vessels in segments i. to viii. is worthy of careful study. The large ventral vessel in front of segment viii. gives off a complex net-work in each segment. A diagram is necessary to make the matter clear.

Uncinaria littoralis (O.F.M.)

I find the following notes in my records:—

So delicate that it fell to pieces when being examined. Could see no nephridia or other organs to answer thereto. Brain seen extending back to segment iii. A small worm $\frac{1}{4}$ to $\frac{3}{8}$ inch long, very pale, but with red blood and enlarged heart in viiith. setigerous segment. No eyespots seen; dark-celled intestine commencing in segment iv. Its motion in water very jerky and peculiar. Tendency to fission behind segment xv. of one specimen. Prostomium with delicate cilia. Four sets of setæ in each of the hinder segments, but two sets or bundles only in first three or four. Very liable to attacks from a parasite which fixes itself in glands of the setæ. Hence the worm often appears to have a large number of capillary or hair-like setæ. This is an ingenious device, and shows how low in the scale of life mimicry operates.²

¹ See Beddard, Monograph of Oligochaeta, pp. 257-8; Benham, Q.J.M.S., xxxiii., p. 107 seq.; Claperede, Beobacht. über Anat. 1863, p. 25.

² For ref. see Beddard, op. cit., pp. 395-6.

The rest of my material consisted of two or three species new to science, and these will be described elsewhere. In the afternoon I visited the Botanic Gardens in the hope of obtaining some specimens of earthworms. The soil however was too dry, and though I might have been able to discover something of interest if I had been guided to the right spots, the Curator was not at hand just at the time, and the workmen were of course unable to help me. I found also at Mr. Bigger's garden in the evening the same absence of specimens owing to the continued drought.

THE DISTRIBUTION OF BIRDS BREEDING IN IRELAND.

BY R. J. USSHER.

In 1894, under the invaluable guidance of the late Mr. A. G. More, I presented a report,¹ on the above subject to the Royal Irish Academy; since then, personal explorations as well as the kind help of my correspondents have added new facts, and it may be well to give to the readers of the *Irish Naturalist* in a popular form the results I have arrived at up to this, in the hope that some of them may aid me further to fill up gaps in my information.

To make these statistics more readable I have grouped the species, selecting in the first case all birds that breed throughout the whole or nearly the whole of Ireland, and having so disposed of these commoner species, I have attempted to present a view of the distribution of the rest according to the nature of their haunts, which restrict them to certain counties, or where this is unsuitable, then on some other basis of arrangement.

I.—BREEDING BIRDS GENERALLY DISTRIBUTED.

For convenience I place in the first group sixty-seven species which I have ascertained to breed in every county in Ireland, except where stated. I include the Quail, as it

¹ *Proceedings R.I.A.*, 3rd Series, vol. iii., No. 3.

formerly bred all over Ireland, though it has now disappeared from most counties.

Kestrel.	Goldfinch.
Sparrow-Hawk.	Lesser Redpoll (<i>except Kerry</i>).
Long-eared Owl.	Linnet.
Barn-Owl.	Bullfinch.
Spotted Flycatcher.	Starling.
Dipper (<i>except Armagh, Longford</i>).	Hooded Crow.
Mistle-Thrush.	Rook.
Song-Thrush.	Jackdaw.
Blackbird.	Magpie.
Hedge-Sparrow.	Swallow.
Redbreast.	House-Martin.
Stonechat (<i>except Meath</i>).	Swift.
Wheatear (<i>except Longford, Westmeath, Kilkenny</i>).	Cuckoo.
Sedge-Warbler.	Kingfisher (<i>except Roscommon</i>).
Whitethroat (<i>except Carlow</i>).	Wood Pigeon.
Willow-Warbler.	Red Grouse.
Chiff-Chaff.	Pheasant.
Goldcrest.	Partridge.
Wren.	Quail (<i>formerly widespread, but has now disappeared from many counties</i>).
Creeper.	Corn Crake.
Great Tit.	Water Rail.
Blue Tit.	Water Hen.
Coal Tit.	Coot.
Long-tailed Tit.	Lapwing.
Pied Wagtail.	Woodcock (<i>except Meath</i>).
Grey Wagtail.	Snipe.
Meadow Pipit.	Common Sandpiper (<i>except Kilkenny, Carlow ? Louth ? Wexford ?</i>).
Skylark.	Redshank (<i>except Dublin, Carlow, Waterford</i>).
Reed Bunting (<i>except Carlow</i>).	Little Grebe.
Corn Bunting (<i>except Monaghan, King's Co., Leitrim</i>).	Heron.
Yellow Hammer.	Wild Duck.
Chaffinch.	Teal.
House-Sparrow.	
Greenfinch.	

These exceptions merely denote blanks in my information, and do not mean, for instance, that the Stonechat does not breed in Meath nor the Whitethroat in Carlow; but in the case of the Redshank some of the blanks may really represent its absence as a breeding species.

The above sixty-seven species, though heterogeneous in so many respects, are all inland breeders, and as such are dispersed throughout Ireland.

II.—TWENTY-THREE SPECIES BREEDING IN CLIFFS AND ROCKS.

The asterisk is used to denote the counties in which each species breeds, and the letter H to indicate where the species formerly bred, but has ceased to do so.

SPECIES.	MARITIME COUNTIES.												INLAND COUNTIES.									
	Donegal.	Donegalderry.	Antrim.	Down.	Louth.	Dublin.	Wicklow.	Wexford.	Waterford.	Cork.	Kerry.	Clare.	Galway.	Mayo.	Sligo.	Tyrone.	Fermanagh.	Leitrim.	Roscommon.	Westmeath.	Tipperary.	Limerick.
Golden Eagle,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
White-tailed Eagle,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Peregrine Falcon,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Rock Pipit,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Chough,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Raven,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Rock Dove,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Oyster-catcher,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Common Gull,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Herring Gull,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Lesser Black-backed Gull,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Great Black-backed Gull,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Kittiwake,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Manx Shearwater,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fork-tailed Petrel,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Storm Petrel,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Razor-bill,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Common Guillemot,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Black Guillemot,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Puffin,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cormorant,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Shag,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Gannet,	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

It will be observed from this table that both the Eagles are becoming extinct. It is to be feared that collectors will destroy what the gamekeeper and the shepherd have left.

The Peregrine, Chough, and Raven breed in mountain-cliffs as well as those on the coast, though in the case of the two latter species, such inland nesting-places have become more and more deserted.

The Rock-Pipit breeds on low-lying shores, as in Louth, and possibly Limerick on the lower Shannon, as well as in sea-cliffs.

The Oyster-catcher, in nearly every case I have seen, breeds on rocks or rocky ground, as on the tops of rocky islands.

The Common Gull breeds on low rocky islets in lakes in the West of Ireland, usually but not always near the coast, but also in a few instances on sea-cliffs and marine islands.

The Lesser Black-backed Gull is an inland as well as a marine breeder, nesting on the great bogs and on islands in the larger lakes both in the inland counties denoted in the table and in inland parts of maritime counties.

The Great Black-backed Gull nests on low rocks where the site is favourable, and even on a sandbank, besides its usual positions, the summits of rocky islands known as "stacks."

The Manx Shearwater and the Petrels breed in the talus so often found on sea-cliffs and lofty islands, whether it be covered with peat or formed of loose stone.

The Puffin, though inhabiting similar places to the latter, breeds more extensively in the peat-covered tops of lofty islands and cliffs, but never I believe resorts to low-lying coasts.

The Cormorant has several breeding colonies in trees on islands in lakes in Galway, Mayo, and Roscommon.

It will be observed in the above table that the peninsular counties which jut out westwards into the Atlantic are the richest in rock-breeders, Donegal, Mayo, Galway and Kerry each exhibiting twenty species or upwards.

III.—SEVEN SPECIES BREEDING ON MOUNTAINS AND MOORS.

The Hen Harrier is fast disappearing before the game-keeper. It is difficult to ascertain where a bird thus marked out for destruction still breeds, but there seems sufficient reason for stating that it does so in Kerry and Galway.

The Twite breeds still more commonly on elevated rocky coasts than on inland mountains.

The Nightjar is very scarce in the North and West of Ireland.

The Golden Plover breeds on bogs not much above the sea-level in Connemara, but usually on mountains.

The Curlew breeds both on bogs and mountains, usually on the great red bogs covered with heather which occupy so much of the inland counties.

IV.—FIFTEEN SPECIES THAT BREED ON LAKES AND MARSHES.

	Donegal.	Londonderry.	Antrim.	Tyrone.	Down.	Armagh.	Monaghan.	Fermanagh.	Cavan.	Longford.	Westmeath.	Mouth.	South.	Dublin.	Wicklow.	Kildare.	Carlow.	Wexford.	Tipperary.	Waterford.	Cork.	Kerry.	Limerick.	Clare.	Galway.	Roscommon.	Mayo.	Sligo.	Leitrim.	
Marsh Harrier, .	?	II?	II	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
Spotted Crake,
Dunlin,
Ringed Plover,
Common Tern,
Black-headed Gull,
Red-throated Diver, .	?
Great Crested Grebe,
Mute Swan, .	.	.	H	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pintail,
Shoveller,
Wigeon,
Pochard, .	.	.	?
Tufted Duck, .	.	.	?	.	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?		
Red-breasted Merganser.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

The circumstances of these species preclude their exhibiting that similarity of distribution which can be traced in the previous tables.

The Marsh-Harrier, formerly widespread, has been exterminated in most of its old haunts. Lord Castletown is the only proprietor I know of who extends protection to it, in his extensive marshes in the Queen's County.

The Spotted Crake is only recorded to have bred in one instance, in Roscommon, before 1853, when Col. Irwin found the eggs, presented by him to the Dublin Museum. But there is reason to suppose that it has bred in the other counties indicated.

The Dunlin has a wide range in the breeding season, and has been found nesting on elevated mountains as well as on low-lying lake-shores in the centre of Ireland, and marshes near the sea.

The Ringed Plover and Common Tern both breed on sea-coasts and islands as well as on islands and shores of many inland lakes.

The Red-throated Diver has been found breeding in one mountainous district full of moorland lakes in Donegal, but the persistent taking of its eggs must soon drive it from this haunt, if that has not been already done.

The distribution of the Mute Swan is in part of an artificial character, though on several large lakes there are practically wild flocks which receive no care.

The Shoveller and Tufted Duck are two species which are extending their breeding-range, that of the Shoveller embracing eastern and southern counties where the Tufted Duck is not known to breed.

The Pintail, Wigeon, and Pochard are three species respecting whose breeding in Ireland we want much more definite information. I have myself only met with the Wigeon in one or two instances in the breeding season, and have never seen the nest or young of any of the three. Still it is impossible to overlook the many statements that have been made of their having bred.

The Red-breasted Merganser, after the Mallard and Teal, is the commonest breeding duck in Ireland.

V.—FOUR SPECIES BREEDING IN LOW-LYING MARITIME LOCALITIES.

	Donegal.	Londonderry.	Antrim.	Down.	Louth.	Dublin.	Wicklow.	Wexford.	Waterford.	Cork.	Kerry.	Limerick.	Clare.	Galway.	Mayo.	Sligo.
Sheldrake, . . .	♂						H									
Sandwich Tern, . . .	H															
Arctic Tern, . . .																
Lesser Tern, . . .																

The Sheldrake breeds far up the estuary of the Shannon in Clare and Limerick.

The Sandwich Tern is at present known to breed only on one island in a lake near the coast of Mayo, which is strictly preserved.

The Arctic Tern departs from its usual marine breeding-habits, by nesting on inland lakes in eastern Mayo, and possibly elsewhere.

VI.—FOUR RARER WARBLERS, WHOSE DISTRIBUTION IS BEING GRADUALLY TRACED UP, AND WHICH ARE POSSIBLY INCREASING IN IRELAND.

	Donegal.	Antrim.	Tyrone.	Down.	Armagh.	Fermanagh.	Cavan.	Longford.	Westmeath.	Meath.	Louth.	Dublin.	Wicklow.	Carlow.	Wexford.	Tipperary.	Waterford.	Cork.	Kerry.	Limerick.	Clare.	Galway.	Mayo.	Sligo.
Garden Warbler,	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
Blackcap,	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
Wood Warbler,	?
Grasshopper-Warbler, . . .	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?

In the cases of the first two species above, the many marks of interrogation result from the birds having been seen in summer, though the nest has not been found in those cases, or, if found, then only in isolated instances. Still even this amount of evidence, on good authority, in the cases of birds

hardly known even by name where they occur, is worth recording. The eggs of the Wood Warbler have been taken at Clonbrock in Galway, where the bird is seen annually, as it also is at Powerscourt in Co. Wicklow.

The Grasshopper-Warbler has so wide a range that, allowing for the difficulty of getting information about this nocturnal songster, it probably extends its range in summer over Ireland, except in the extreme West. It is by far the most common species of the four, while the Wood Warbler is the rarest.

VII.—TWO SPECIES THAT BREED IN CONIFERS, AND ARE GAINING GROUND.

The uncertainty expressed in so many cases as to the Cross-bill breeding results from its gipsy habits, breeding one year in a place where it is not found the next. It is practically a bird of modern introduction, owing to increase of fir plantations. From the same cause the Siskin seems to breed more permanently and extensively than it used to do. It is much more common in summer than was supposed.

VIII.—THREE NEW-COMERS OR SPECIES NOT HEARD OF UNTIL RECENT YEARS.

The Redstart, announced in 1885 to breed at Powerscourt, has since been found breeding in a second locality in Wicklow, and in 1894 I found it breeding in Tyrone.

The Tree-Sparrow, first announced in 1852, is apparently still confined to the vicinity of the Co. Dublin coast.

The Stock-Dove, first noticed in the north-east of Ireland in 1875, has now extended to Queen's County and Carlow, where it breeds, and a specimen has been announced from Galway (*Irish Naturalist*, 1896, p. 192).

IX.—THREE SPECIES WHOSE BREEDING RANGE IS RESTRICTED TO A PART OF IRELAND.

	Donegal.	Antrim.	Tyrone.	Down.	Armagh.	Monaghan.	Fermanagh.	Cavan.	Longford.	Westmeath.	Louth.	Dublin.	Kildare.	Queen's Co.	King's Co.	Kilkenny.	Carlow.	Wexford.	Tipperary.	Waterford.	Cork.	Galway.	Roscommon.	Mayo.	Sligo.	Leitrim.
Whinchat,	*	*	*	?	*	*	?	*	*	?	*	*	*	*	*	?	*	*	*	*	*	*	*	*	*	
Yellow Wagtail	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Jay,	*	H	*	*	*	*	*	*	*	*	*	H	*	*	*	*	*	*	*	*	*	*	*	*	*	

With the exception of two pairs of Whinchats seen near the Nore in Co. Kilkenny by Mr. H. C. Hart on 5th July, 1884, I have no evidence of the species breeding south of Dublin. It is not uncommon in parts of the North and North-west.

The Yellow Wagtail breeds round the shores of Lough Neagh in Ulster, and on islands in Lough Corrib, Mask and Carra in Connaught.

Besides these widely separated districts there is no other record of its nest having been found in Ireland except once in the Co. Dublin by Mr. Williams.

The Jay's breeding-range extends over that part of Ireland drained by the rivers that flow out at Waterford Harbour. It formerly included counties from which the species afterwards disappeared, but it seems to be now extending in some districts.

X.—FIVE SPECIES CONCERNING WHOSE BREEDING IN IRELAND
WE HAVE NOW LITTLE OR NO EVIDENCE.

—	Donegal.	Londonderry.	Antrim.	Down.	Armagh.	Dublin.	Wicklow.	Queen's Co.	Wexford.	Waterford.	Cork.	Kerry.	Mayo.	Sligo.
Common Buzzard, . . .	H	H	H	H	.	.	.	.	.	.	.	.	.	.
Woodlark,	H?	H?	H?	H	H?	.	H	H?	.	.	.	.
Carriion-Crow,	H	.	.	.	.	H?	.	.	H	H	H?	.
Turtle-Dove,	H	.	H	.	.	.	H	.	.	.
Roseate Tern,	H	.	H	.	H	.	.	.	.	.

The Buzzard, which Thompson recorded as breeding in four northern counties, seems to have been quite exterminated since his time.

In 1894 the Woodlark was found breeding in Co. Wicklow (*Irish Nat.*, 1894, p. 137). It may still linger in Northern Cork, but though formerly well known it seems to have been almost exterminated by bird-catchers.

The Carrion Crow's rarity in Ireland has been on record since the time of King John. Since Thompson noted its former occurrence in Antrim, Lord Castletown has known of it in the Queen's County, and Mr. Corbet has shot both old and young near Queenstown Harbour, and others mention it from Mayo, but the most satisfactory instance occurred in Kerry in 1864, when Mr. J. R. Hardy obtained eggs and a specimen of the bird which he has presented to the Science and Art Museum, Dublin.

The Turtle-Dove is stated by Thompson to have bred once in Down and once in Kerry. A female with eggs in her ovary was shot in Co. Dublin; but though this species appears in certain localities almost regularly in ones and twos, it disappears again without being known to breed.

The Roseate Tern is recorded by Thompson to have bred in Down, Dublin, and Wexford, but at the present day no breeding-place of this species in Ireland is known.

The Bittern has been omitted from these lists, as the last instance of its breeding in Ireland, recorded by Thompson, took place over fifty years ago.

A LIST OF IRISH OSTRACODA
COMPILED FROM BRADY AND NORMAN'S CATALOGUE.

BY R. F. SCHARFF, PH.D.

THE only paper ever published exclusively on Irish Ostracod Crustaceans is one on the species observed in Belfast Lough by the late Dr. Malcomson (*Proc. Belfast Nat. Field Club*, 1884-5). No separate complete list of the Irish Ostracoda has appeared in print, and I venture therefore to present one to the readers of the *Irish Naturalist*, in the hope that the study of this interesting group of animals may thereby be facilitated. Anyone in Ireland who wishes to investigate Ostracods can thus at a glance see what species have been recorded from the inland waters or the sea surrounding this country.¹

The list of the species as here given has been compiled from Brady and Norman's "Monograph of the Marine and Freshwater Ostracoda of the North Atlantic and of North-western Europe." This very important and excellent work was communicated to the Royal Dublin Society by Prof. Haddon and was published in the *Transactions* of the Society. The first part appeared in 1889, and it was completed in 1896. Figures of most of the species are given by the authors, and many descriptions of new species appear here for the first time. There are altogether 27 freshwater and 120 marine species.

I have marked with an asterisk (*) those species which have never been found elsewhere except in Ireland or the surrounding seas.

IRISH FRESHWATER OSTRACODA.

Cyprididae.

- Cypria exsculpta* (Fisch.)
- C. ophthalmica* (Jurine.)
- C. levata* (O. F. Müll.)
- C. serena* (Koch)
- Cypris fuscata* (Jurine.)
- C. incongruens*, Ramd.
- C. pubera*, O. F. Müll.
- C. reticulata*, Zadd.
- C. prasina*, Fisch.
- C. bispinosa*, Lucas.
- Erpetocypris reptans* (Baird.)

Cypridopsis vidua (O. F. Müll.)

C. aculeata (Lilljeb.)

C. villosa (Jurine.)

C. variegata, Brady and Norm.

Potamocypris fulva, Brady.

Notodromas monacha (O. F. Müll.)

Candonia candida (O. F. Müll.)

**C. elongata*, Brady and Norm.

C. lactea, Baird.

C. pubescens (Koch.)

C. Kingsleii, Brady and Roberts.

C. fabiformis (Fisch.)

¹ I hope shortly to publish a map indicating the boundaries of the Irish Marine area, as we propose to define them in the new arrangement of the Collection of Irish Marine Animals in the Dublin Museum.

Darwinulidae.

Darwinula Stevensoni, Brady and Roberts.

Cytheridae.

Metacypris cordata, Brady & Roberts.
Limnocythere Sancti-patricii, Brady and Roberts.
Cytheridea lacustris (G. O. Sars.)

IRISH MARINE OSTRACODA.

Cytheridae.

**Aglaia complanata*, Brady and Roberts.

Paracypris polita, G. O. Sars.

Pontocypris mytiloides (Norm.)

P. hispida, G. O. Sars.

P. acupunctata, Brady.

P. trigonella, G. O. Sars.

Anchistrochells acerosa (Brady.)

Argilloccia cylindrica, G. O. Sars.

Bairdia inflata, Norm.

B. obtusata, G. O. Sars.

Cythere lutea, Müll.

C. pellucida, Baird.

C. confusa, Brady and Norm.

C. porcellanea, Brady.

C. macallana, Brady.

C. tenera, Brady.

C. semipunctata, Brady.

C. badia, Norm.

C. crispata, Brady.

**C. cribrosa*, Brady, Crossk., and Roberts.

C. sulcifera, Brady.

C. gibbosa, Brady and Roberts.

C. rubida, Brady.

C. albomaculata, Baird.

C. Robertsoni, Brady.

C. convexa, Baird.

C. marginata, Norm.

C. Jeffreysii, Brady.

C. limicola, Norm.

C. cuneiformis, Brady.

C. navicula (Norm.)

C. globulifera, Brady.

C. cluthae, Brady, Crossk., and Roberts.

C. villosa (G. O. Sars.)

C. pulchella, Brady.

C. echinata (G. O. Sars.)

Cythere acanthoderma, Brady.

C. dasyderma, Brady.

C. seabrocuneata, Brady.

C. quadridentata, Baird.

C. emaciata, Brady.

C. tuberculata (G. O. Sars.)

C. concinna, G. O. Sars.

C. finmarchica (G. O. Sars.)

C. angulata (G. O. Sars.)

C. dimelmensis (Norm.)

C. antiquata (Baird).

C. Whitei (Baird).

C. Jonesii (Baird).

Cytheridea elongata (Brady).

C. papillosa, Bosquet.

C. punctillata, Brady.

C. torosa (Jones).

C. subflavescens, Brady.

G. sorbyana, Jones.

Eucythere declivis (Norm.)

Krithe bartonensis (Jones).

K. producta, Brady.

Loxoconcha impressa (Baird).

L. guttata (Norm.)

L. viridis (Müll.)

L. multifora (Norm.)

L. pusilla, Brady and Roberts.

L. taramindus (Jones).

L. fragilis, G. O. Sars.

Xestoleberis aurantia (Baird).

X. depressa, G. O. Sars.

Cytherura gibba (Müll.)

C. cornuta, Brady.

C. sella, G. O. Sars.

C. acuticostata, G. O. Sars.

C. striata, G. O. Sars.

C. angulata, Brady.

C. undata, G. O. Sars.

C. producta, Brady.

C. nigrescens (Baird).

Cytherura simplex, Brady and Norm.
C. similis, G. O. Sars.
C. fulva, Brady and Roberts.
C. clathrata, G. O. Sars.
C. cellulosa (Norm.)
Cytheropteron latissimum (Norm.)
C. punctatum, Brady.
**C. crassipinnatum*, Brady and Norm.
C. alatum, G. O. Sars.
C. montrosiense, Brady, Crossk., and Roberts.
C. angulatum, Brady and Roberts.
C. depresso, Brady and Norm.
Bythocythere constricta, G. O. Sars.
B. turgida, G. O. Sars.
B. recta (Brady).
B. simplex (Norm.)
Pseudocythere caudata, G. O. Sars.
Sclerochilus contortus (Norm.)
Cytherideis subulata, Brady.
Cytherois Fischeri (G. O. Sars.)

Paradoxostomatidae.

Paradoxostoma variable (Baird).
P. ensiforme, Brady.
P. abbreviatum, G. O. Sars.
P. obliquum, G. O. Sars.
P. Normani, Brady.
P. pulchellum, G. O. Sars.

P. hibernicum, Brady.
P. arcuatum, G. O. Sars.
P. orchadense, Brady and Roberts.
P. Hodgei, Brady.
P. flexuosum, Brady.
Machærina tenuissima (Norm.)

Asteropidae.

Asterope mariae (Baird).
A. teres (Norm.)
A. elliptica, Philippi.

Cypridinidae.

Crossophorus imperator, G. S. Brady.
Philomedes interpuncta, Baird.
P. Macandrei (Baird).

Sarsiellidae.

**Nematohamma obliqua*, Brady and Norm.
Sarsiella capsula, Norm.

Halocypridae.

**Conchocia Haddoni*, Brady and Norm.
Conchocilla daphnoides, Claus.

Polycopidae.

Polycopis orbicularis, G. O. Sars.
Polycopis compressa (Brady & Roberts)



A BOOK ON FRUIT TREES.

Fruit Culture for Amateurs. By S. G. WRIGHT. With an appendix on Insect and other Pests injurious to Fruit Trees by W. D. DURY. Pp. 244. 146 figs. in text. London: L. Upcott Gill, 1897. Price 3s. 6d.

A most useful work for those who take an interest in gardening work, and who wish to obtain reliable information on the best kind of fruit-trees to plant, how to plant them, and how to treat them when planted. Indeed so complete are the lists, and so extended are the many cultural directions which are given, that others besides those for whom the book portends to have been specially written, may, when seeking information, unhesitatingly turn to the pages of this work. Amateurs in the strict sense of the term may feel somewhat puzzled and disheartened at the length of some of the lists of "suitable varieties," which we think might have been somewhat curtailed, or a second and much reduced list of the best and most prolific varieties, for small gardens, might with advantage have been added. Thus in the list of apples, some of the varieties do not as a rule succeed particularly well in Irish gardens, whereas Echlinville, Peasgood Nonsuch, Bramley's Seedling, Golden Noble, New Hawthronden, are kitchen varieties which may be relied on to grow in almost any soil and situation. The author wisely draws attention to the pleasure and profit which can be derived from covering waste wall-spaces with suitable fruit-trees. On the Continent, especially in France and in Belgium, this point receives great attention, and fine crops of first-rate fruit are harvested from trees covering unsightly walls of outhouses, stables, barns, and buildings of all sorts. Such crops could be equally well obtained in Ireland.

Another point we are glad to note receives due prominence is the great importance of summer pruning of fruit-trees, and it is no exaggeration to say that it is of much more importance than the winter pruning, although in so many cases summer pruning is totally neglected. In this, as in all other cases, if the directions given by the author be followed, there will be no longer necessity for the complaint so often heard—"My fruit-trees never bear any fruit." The concluding portion of the book is occupied with a list of "Insect and other fruit Pests," which greatly adds to its general usefulness, more especially as means of combating and destroying these "Insects and other Pests" are given. Mr. Wright's name is well known in England as that of a good practical gardener and a successful fruit-grower, and he has embodied the result of many years work and observation in the book now before us, thereby earning the thanks of all who take practical interest in such matters.

F. W. M.

PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY OF IRELAND.

Recent gifts include an Ocellated Sand Skink from Dr. F. F. MacCabe, a Long-eared Owl from Mr. C. K. Bushe, a Badger from Mr. A. Rotheram, a pair of Pine Martens from Major J. H. Connellan, seven Ring-Snakes from Judge Boyd, and a number of freshwater fish from Mr. F. Godden.

3,581 persons visited the Gardens in January.

The Sixty-fifth Annual Report adopted at a meeting held January 26th shows encouraging progress. The number of admissions to the Gardens during the year 1896 was 124,836, an increase of 12,000 on 1895, while the receipts were £1,755 8s. 1d., as against £1,687 19s. 5d. the previous year. Still better is the increase from member's entrance fees and subscriptions; the rise from £519 in 1895, to £745 last year, shows a marked accession of new members, though it is considered that the very special efforts put forward by the Council should have met with even greater success.

The Council lost two of their number during the year;—Mr. E. Pennington by death and Gen. Sir R. Sankey by resignation; Col. G. T. Plunkett and Mr. G. A. Stephenson were co-opted to fill the vacancies thus caused.

Among the improvements carried out during 1896, the completion of the new Goat House and Rockery is specially noticeable. The goats and ibexes will now be shown among surroundings imitative of their natural haunts, and the good stock of animals already acquired will be added to this year. The cost of the undertaking has been great; a special donation of £10 towards it by Dr. C. B. Ball is acknowledged.

Another excellent piece of work has been the alteration of the Aquarium House. Without interference with the fish tanks, a large Alligator pond has been formed in the centre of the building, while at one end have been erected heated compartments with plate-glass fronts for tropical snakes and lizards, at the other end cages and a tank for diving birds, such as Cormorants and Penguins. A glass front to this tank enables the motions of the birds, while diving, to be observed and studied. It is hoped that this house will shortly be opened to the public, when it will doubtless prove a great attraction.

Re-labelling of the animals has been carried out during the year on an extensive scale. In cages where many creatures are kept together, it is important to define which label refers to which animal, and this has been done for the Aviary and Gull-enclosures, by means of a number of water-colour drawings kindly executed by Mrs. Scharff and mounted by Miss Dixon.

This year it is intended to erect a new house and paddock for the llamas and camels; a plan of the intended structure is given and its completion will be a great gain to the Gardens. Unfortunately two camels died last year in the old house. New quarters for the marsupials are also contemplated. It is earnestly to be hoped that sufficient funds will be at the disposal of the Council for carrying out these important works

Except the loss of the two Camels just mentioned, the Society's collection has been remarkably free from deaths. The poisoning of the interesting Siamese Brown Macaque by pills administered by some ruffianly visitor is, however, a sad episode of the past year. It is satisfactory to notice that the two Anthropoid apes—the Chimpanzee and Gibbon—are still alive and flourishing.

Two litters of lion-cubs of two each, were born during the year, and three of the cubs are alive and thriving. Two new lionesses from Africa have been acquired to keep up the breeding-stock, replacing two of the old ones. A litter of four puppies born by the Cape Hunting-Dog died in three days owing to their mother's anxiety to find a concealed spot to lay them in. A second litter is expected shortly and a special burrow and den, which have been prepared, will it is hoped enable the young to be reared. The period of gestation is 80 days and the puppies are black with white patches when born, not with ochreous markings like the parents.

A large number of donations, recorded from month to month in the *Irish Naturalist*, have been received. Specially noticeable are a pair of South African Crowned Cranes from Mr. L. O. Hutton, three Llamas from Mr. J. Nelson; West African crocodiles and lizards from Dr. E. J. Fenton, and a Moose-cow (of which a good photograph is given) from the Earl of Aberdeen.

DUBLIN MICROSCOPICAL CLUB.

JANUARY 21.—The Club met at the house of Dr. W. FRAZER, who exhibited different specimens of genuine Shagreen and of other materials usually so called, used for decorative purposes, covering spectacle cases, mathematical instruments, &c., with the view of eliciting information as to their nature, especially those of green colour with imbedded small rounded white masses. Any information on the subject will be thankfully received.

PROF. COLE showed grains separated from Portland Oolite by Mr. R. Welch, with similar calcareous grains, for comparison, from deposits now forming in the Great Salt Lake of Utah. In both cases an algal origin has been claimed for the grains, while many authors support an inorganic mode of deposition. Prof. Cole had been unable to detect algal structures in a large number of sections of the Utah grains.

Dr. Hurst suggested that as the organic portion of the bodies exhibited by Prof. Cole was probably exceedingly small and therefore liable to be destroyed by the effervescence caused by ordinary methods of decalcification, a method should be adopted which he had devised some years ago for a similar purpose, and which had given excellent results. The objects to be decalcified are placed, in water or a solution of corrosive sublimate, in a narrow-mouthed bottle, the greater part of the bottle being empty. A slow stream of CO_2 is now passed into this bottle

for a few days, the delivery-tube not dipping into the water. The object of this is to almost—but not quite—saturate the water with CO_2 and so convert the calcium carbonate of the object into the soluble bicarbonate. It is essential that the CO_2 pressure shall not exceed the atmospheric pressure, otherwise when the pressure is released in order to remove the decalcified objects, effervescence would ensue, and the tissues might be injured thereby.

PROF. T. JOHNSON exhibited specimens of *Halicystis ovalis*, a non-cellular green-stalked alga, in some respects similar to the green alga *Botrydium granulatum*. The species was dredged in July last in Belfast Lough, has since been obtained at low water in Dalkey Sound, and in Dungarvan Bay at Helwick Point. The species is recorded in the *Irish Naturalist* for September. The first locality is partly due to Miss Hensman, the other two to Miss Knowles.

MR. M'ARDLE exhibited *Cephalozia hibernica*, Spruce MSS. which he found at O'Sullivan's Cascade, Killarney, in 1893, when collecting for the Flora and Fauna Committee of the Royal Irish Academy. The plant resembles *Cephalozia connivens*, Dicks., and is remarkable for the large hyaline cells of its leaves which have thick walls of delicate texture; decurrent, bifid at the apex to one-third or more of their length, segments erect or connivent, acuminate, of from two to four single cells. Out of three packets of specimens which were exhibited no fruit was found excepting young amentæ which enclose the antheridia. He also showed a drawing of the plant by Mr. Pearson, who published with it a description of the plant in the *Irish Naturalist* in December, 1894.

DR. C. HERBERT HURST exhibited a series of sagittal sections of the anterior portion of a common earthworm, *Lumbricus herculeus*, Sav., demonstrating that the cavities of the calciferous glands in the wall of the oesophagus, are longitudinal spaces, continuous from one gland to the other of the same side and opening, in front, into the oesophageal pouch, and having no other opening. The direct openings of these glands into the oesophagus which had been described, were, he said, purely imaginary and non-existent.

DR. MCWEENEY showed pure cultures of *Achorion Schonleinii*, the fungus which produces the disease of skin and hair known as *Favus*. The seed material was obtained through the courtesy of Dr. Coleman from a patient in the Whitworth Hospital. It developed well on both ordinary and glycerine agar at blood heat, and microscopic slides made from the cultures displayed the peculiarities of the growth very well. The botanical position of this fungus was still obscure owing to the ascigerous condition not having been hitherto observed. The exhibitor had in view some experiments with the object of clearing up this point.

DR. McWeeny also showed hairs affected with *Trichomycosis nodosa* (Patteson), otherwise known as *Lepothrix*, the only bacterial disease of hair hitherto known. The shaft of the affected hairs was enclosed in a sort of hard nodular sheath of a dull yellow hue, others swelling up into discrete masses, or nodosities which consisted of masses of short

bacilli. He had succeeded in cultivating these organisms and would communicate further details later on.

Finally he exhibited a cultivation of the Potato disease *Peziza sclerotiorum*, Lib., showing enormous sclerotia in process of formation. The substratum consisted of sterilised slices of potato.

Mr. A. FRANCIS DIXON exhibited a camera for use with microscope. The instrument can be used with the microscope in a vertical position, being adapted to the draw-tube of the instrument. The whole camera except the dark slide is made of aluminium, and is so light that it does not press too severely on the rack movements of the microscope. The maker of the camera is R. Feuss, Berlin.

Mr. A. VAUGHAN JENNINGS showed under the microscope a specimen of the very rare moss *Ædipodium Griffithianum*, collected near the top of Snowdon. The moss is remarkable for its broad, large-celled leaves and for the thick seta graduating into a tapering apophysis, which, in turn, is not sharply marked off from the capsule. These characters have been regarded as suggesting affinities with the *Hepaticæ*; while many systematists place the genus near *Splachnum*. More commonly the plant is reproduced by gemmæ in the axils of the leaves, as shown in the preparation. The exhibitor considered that his specimens represented a distinct variety, apparently not yet scientifically recognised; but characterized by the extreme shortening of the stem, so that the rosette of leaves and gemmæ become almost sessile on the ground.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

FEBRUARY 9TH.—Dr. HERMANN WALTER lectured on "The Mystery of Indian Fakirism."

Professor M. F. FITZGERALD, B.A., read a paper on "Contouring with Barometer in Mourne Mountains;" the paper was illustrated by diagrams and maps.

BELFAST NATURALISTS' FIELD CLUB.

JANUARY 26TH.—The president (Mr. LAVENS M. EWART) in the chair, Mr. F. J. BIGGER (honorary secretary) read a paper on the discovery of a souterrain at Stranocum, in the demesne of Mr. W. Ford-Hutchinson, which was illustrated by a number of excellent drawings and sections made by Mr. W. J. Fennell, C.E., and by numerous photos taken by Mr. Alex. Tate, C.E. After some remarks by Messrs. Lockwood, Cunningham, Wilson, Dickson, and others, the president called upon Dr. W. DONNAN to read a communication on fresh-water algae. Dr. Donnan began by showing the ease with which the study of these lowly forms of life may be carried on, as every pool or sheet of standing water teems with them. He then briefly described their position in the vegetable world, coming among the thallophytes, there being no distinction between leaf and stem. Dr. Donnan then appealed to members interested in microscopic work to co-operate with him in re-organising this branch of the Club's

work. The various algae described were then exhibited under microscopes by Dr. Donnan and inspected by the members. After the election of three new members, the meeting closed.

BOTANICAL SECTION—JANUARY 30TH.—The section met when Rev. C. H. Waddell gave an account of the native *Geraniums*, St. John's Worts, Mallows, &c., illustrated by plants from his own and the Club's lately acquired Herbarium. Miss M. C. Knowles presented a large parcel of beautifully mounted plants, including the rare *Spiranthes Romanzoffiana*, to be added to the Club's Herbarium. It is hoped others will follow this example, and that the set may be made complete at least in common plants, and available to illustrate the monthly lectures.

N O T E S.

Ignorance and Introduction.

In the *Entomologist* for December Mr. Purefoy informed the scientific world that he believed neither the Brimstone Butterfly (*Gonepteryx rhamni*) nor either species of *Rhamnus* to be native in Ireland, and he had filled these supposed gaps in our flora and fauna by introducing both plants and a colony of the insects into Co. Tipperary. In the succeeding number of our contemporary, Mr. W. F. de V. Kane pointed out that a glance at his list of Irish lepidoptera (in that very magazine) and at the pages of "Cybele Hibernica" would have saved Mr. Purefoy from his inaccurate statements. We are not surprised that such ignorance of the Irish flora and fauna should have been accompanied by the desire to introduce something; the risk of falsifying future distributional records would be of no account to one for whom "Cybele Hibernica" was compiled in vain.

It is sometimes thought that, provided such introductions are notified, no harm is done. We do not agree with this opinion. In the present case, Mr. Kane points out that Mr. Hart's record of *G. rhamni* from Queen's County (*I. Nat.*, vol. v., p. 87) may rest on a specimen from Mr. Purefoy's colony. These introductions throw doubt on the genuineness of any occurrence of the species within a large radius. The wild life of a country is something to be studied and treated with reverence; the introducer is almost as great an enemy to science as the exterminator.

BOTANY.

PHANEROGAMS.

A Christmas Primrose.

On Christmas Eve last Mrs. Johnson found a primrose plant in full bloom just outside Poyntzpass on the road-side between the village and Acton Glebe. Two blossoms were fully expanded and there were several buds ready to bloom.

W. F. JOHNSON.

Flowering Plants of Co. Tyrone.

The following are some of the flowering plants collected by me in Co. Tyrone, in the beginning of July, 1896, and the localities in which I found them.

Cochlearia anglica, abundant along the shores of the River Foyle from a little above Dunnalong, which is close to the boundary between Co. Tyrone and Co. Derry, as far as Strabane. *Chelidonium majus*, near Omagh, at Newtownstewart, and plentiful about the village of Coalisland. *Silene anglica*, growing on waste ground near Coalisland along with *Papaver dubium* and *Lychnis alba*. *Hypericum androsaemum*, about Omagh, in glens on the sides of Mullaghcarn, and also by the shores of Lough Neagh near Washing bay. *Hypericum humifusum*, at Washing bay, and a few plants at Baronscourt. *Althaea officinalis*, at Washing bay, Lough Neagh, probably an escape. *Malva rotundifolia*, on the sands at Washing bay. *Geranium phaeum*, a few plants near a ruin between Stewartstown and Coalisland. *Geranium pyrenaicum*, by the roadside near Newtownstewart. *Euonymus europaeus*, in the hedges between Stewartstown and Washing bay. *Vicia angustifolia*, Strabane, and also at Washing bay. *Rubus saxatilis*, in a small glen near Strabane. *Pyrus malus* var. *mitis*, the shores of Lough Neagh near Doon Point, and also near Strabane. *Parnassia palustris*, meadows near Eva Cottage, Lough Neagh. *Sedum Telephium*, near Eva Cottage, Lough Neagh. *Sedum rupestre*, on an old wall near Omagh. *Myriophyllum spicatum*, drains at Lough Neagh, near Doon Point. *Circeea alpina*, Omagh, at Newtownstewart, and abundant in Strabane glen. *Circeea alpina* var. *intermedia*, Strabane glen. *Cicuta virosa*, shores of Lough Neagh at Eva Cottage. *Cenanthe fistulosa*, in swampy places near Eva Cottage, Lough Neagh. *Gallium Mollugo* var. *insubricum*, at Strabane. *Filago minima*, plentiful on the sandy banks of a stream at Omagh, and also on the sands at Washing bay. *Gnaphalium sylvaticum*, roadsides about Omagh, fields at Newtownstewart, and at Strabane. *Bidens tripartita*, in a drain near Lough Muck. *Senecio sylvaticus*, in a field at Strabane and at Washing bay. *Arctium intermedium*, roadside near Washing bay. *Cnicus pratensis*, in a meadow between Coalisland and Stewartstown. *Crepis paludosa*, on sides of Mullaghcarn. *Hieracium vulgatum*, a few plants on a wall near the railway station at Newtownstewart. *Campanula rotundifolia*, a few plants at Ballymagorri, near Strabane, canal side at Strabane, and at Stewartstown. *Campanula rapunculoides*, roadside near Dungannon. *Lysimachia vulgaris*, by the canal near Strabane, and also at Doon Point, Lough Neagh. *Lysimachia nummularia*, apparently wild in a wood near Omagh. *Anchusa sempervirens*, Newtownstewart. *Solanum Dulcamara*, by the canal at Strabane, and by the River Strule at Omagh. *Mimulus luteus*, abundant by the Foyle from Dunnalong to Strabane, a few plants in a bog at Omagh, in a stream on the side of Bessy Bell. *Veronica montana*, Strabane glen, Baronscourt, and at Omagh. *Melampyrum pratense*, in Glen Hordial, near Omagh, and in Strabane glen. *Utricularia vulgaris*, bogs near Omagh. *Utricularia minor*, in a bog near Lough Muck. *Pinguicula lusitanica*, Bessy

Bell and Mullaghcarn. *Mentha piperita*, a few plants by the side of the canal near Strabane. *Scutellaria galericulata*, shore of Lough Catherine, Baronscourt, and also at Lough Neagh, Eva Cottage. *Galeopsis versicolor*, common in cultivated fields about Strabane. *Lamium amplexicaule*, Washing bay, Lough Neagh. *Lamium album*, roadside near Dungannon. *Chenopodium Bonus-Henricus*, near Stewartstown. *Polygonum lapathifolium*, Strabane. *Humulus Lupulus*, at Stewartstown. *Parietaria officinalis*, on walls at Strabane. *Empetrum nigrum*, on the summit of Mullaghcarn. *Listera cordata*, among heather on Bessy Bell at about 1,000 feet. *Habenaria bifolia*, on Mullaghcarn and on Bessy Bell. *Juncus glaucus*, roadside between Washing bay and Stewartstown. *Juncus supinus*, bogs at Omagh, drains at Strabane. *Sparganium simplex*, drains near Lough Muck. *Sagittaria sagittifolia*, Doon Point, Lough Neagh. *Butomus umbellatus*, Doon Point, Lough Neagh. *Scirpus pauciflorus*, mountain bogs near Omagh. *Scirpus sylvaticus*, banks of the Strule near Omagh. *Rynchospora alba*, in a bog near Stewartstown. *Carex teretiuscula*, abundant by Lough Muck. *Carex aquatilis*, banks of the River Finn near Strabane. *Carex hirta*, by River Strule at Omagh. *Carex curta*, *Carex lavigata*, *Carex pendula* and *Carex paniculata*, at the head of Strabane glen. *Milium effusum*, abundant in Strabane glen. *Catabrosa aquatica*, near Newtownstewart. *Glyceria plicata*, near Omagh. *Festuca sylvatica*, Omagh, and also plentiful in Strabane glen. *Bromus secalinus*, hedges near Strabane. *Bromus commutatus*, by the roadsides at Strabane.

Pilularia globulifera I found growing abundantly in a shallow drain and in swampy ground about one mile north of Washing bay. "Cybele Hibernica" gives "marshy ground about two miles from the mouth of the Blackwater near Lough Neagh" as a locality for this plant. This is apparently the place meant, but it is in District 10 instead of in District 12 as given in "Cybele."

So far as I can make out, *Silene anglica*, **Althea officinalis*, *Malva rotundifolia*, *Arctium intermedium*, *Hieracium vulgatum*, **Campanula rapunculoides*, *Habenaria bifolia*, *Carex teretiuscula*, *Carex aquatilis*, *Glyceria plicata*, and *Bromus secalinus* are additions to District X of the "Cybele Hibernica." I have to thank Mr. S. A. Stewart and Mr. Praeger for the trouble they have taken in helping me to name my plants, and Mr. Praeger for sending critical specimens to specialists.

M. C. KNOWLES.

Exuberant Growth of a Bramble.

A few days after Christmas, at St. John's Point, Co. Down, Mr. Welch and I observed a bramble that showed so remarkable a year's growth that it may be worth noting. It appeared to be a strong young plant, and grew on the seaward side of a low loose wall on a poor and exposed pasture close to the beach, and open to the sea. Five stems, arching below, but prostrate for the greater portion of their length, represented the growth of the past season. From tip to tip of two opposite stems

the distance was just 50 feet, one stem being 26 feet long, the other 24 the three remaining stems were somewhat shorter. But this was not all, for each of the stems had produced a number of secondary axillary branches. Those on the largest stem were 14 in number, and their aggregate length was 105 feet; so that this one shoot had perfected altogether 131 feet of stem! An approximate estimate showed that the plant had last season produced altogether about 500 feet of stem. The termination of each main shoot and most of the secondary branches was firmly rooted in the soil, with a large bud at the point, each ready to produce an independent plant next season. In the absence of leaf and flower, it was not possible to determine the species.

R. LLOYD PRAEGER.

***Carduus Crispus* In Co. Down.**

As this plant is extremely rare in the North-east, it may be worth recording that it grows about the ancient church at St. John's Point, Co. Down, accompanied by *Anthriscus vulgaris*.

R. LLOYD PRAEGER.

ZOOLOGY,

INSECTS.

***Coleoptera* at Poyntzpass.**

January and February are not usually looked upon as months abounding in insect life, but to those who take the trouble of searching for them in their winter quarters many insects can be found. On January 14, I had a haystack moved, and among the debris remaining where its base had been were various insects, and the following coleoptera were captured:—*Quedius boops*, *Encephalus complicans* (a curious stumpy staphylinid which is often found in ants' nests), *Stenus speculator*, *Omalium concinnum*, *Cononimus nodifer*, *Enicimus transversus*, and *Cryptophagus cellaris*; there were also a number of *Atomaria pusilla*. On February 2nd I got a couple of bags of moss from a neighbouring wood, taking it mostly from the base of fir trees. Among my captures the following may be noted:—*Aleochara cunicularum*, a somewhat unusual locality for this insect, *Homalota longicornis*, *H. atramentaria*, *Tachysa atra*, *Tachyporus obtusus*, and its var. *nitidicollis* (the latter I find much more common than the type in Ireland). *T. brunneus*, *Hypocyptus ovulum*, *Phthonthus splendens*, *Lathrobium quadratum*, *Stenus brunnipes*, Steph., *Lathrimaum unicolor*, *Othius myrmecophilus*, *Scydmaenus collaris*, *Anaitis ocellata* (this fine lady-bird is more usually obtained by beating fir trees in the summer, but I met with it in moss at Armagh). *Atomaria atricapilla*, *Longitarsus ater*, F., *L. suturalis*, Marsh., and *Plectroscelis concinna*. Besides there were many commoner species with the usual complement of spiders, woodlice, millipedes, with a stray caterpillar or two, and a few handsome ichneumon flies, while various "spring-tails" jerked themselves about. This will give an idea of the insect life to be found in a bunch of moss at this time of year.

W. F. JOHNSON.

Insect Folk-Lore.

The ideas about insects held by the uninitiated and especially by country folk are peculiar. I met a man who though unable to read was yet a very good gardener, who was fully persuaded that butterflies turned into caterpillars, and I had to give him a long discourse on the subject, and even then I doubt very much whether he believed me at all.

The venomous character assigned to many insects which are perfectly harmless is also a common error with such people. A country woman assured me that the common *Telephorus fulvus* gave a very sore bite and that the bitten part would swell up. She was much astonished when I assured her that the creature could not possibly hurt her, but it was easy to see that there was a lurking doubt as to my credibility. I received a most remarkable piece of information with regard to the habits of the common House Cricket (*Acheta domesticus*) from a native of Donegal, and it is to be hoped that it is only Donegal crickets that are so wicked. This person assured me that if you trod on the toe of a cricket (which particular toe I could not find out) the infuriated beast would at once walk off to your clothes and eat holes in them. Of course the cricket would know a person's Sunday 'shute' and pick it out for especial attention. I suggested that a cricket did not indulge in such luxurious feeding and hinted at clothes-moths, but my suggestion was treated with scorn, the implication of course being, that the moths would always be at work, whereas the cricket waited to have his toe trodden on, and then proceeded to 'take it out' of his insulter's clothes. The migratory habits of crickets have given rise to the superstition that, if crickets come to a house where there are marriageable girls or boys, a marriage will take place. What happens when there is no one to marry I could never find out. These ideas about insects are interesting if only to show what had been noticed by people in general, and I daresay many of the readers of the *Irish Naturalist* could contribute stories on this subject.

W. F. JOHNSON.

***Agabus arcticus*, Payk., a Water-beetle new to Ireland.**

An important addition has recently been made to our insect fauna by Mr. E. C. Farran, in the discovery of the water-beetle *Agabus arcticus*, Payk., when collecting last summer on Kippure, Co. Wicklow. Mr. Farran has kindly given the specimens to the Dublin Museum.

The distribution of the species is noteworthy, as in Britain it has been recorded from the extreme north of England (Northumberland district) and from the Scotch Highlands. As to the continental range the only habitat given in the European catalogue of Heyden Reitter and Weise is Lapland, but according to Canon Fowler ("British Coleoptera" vol. 1, p. 195), it has also been traced across Arctic Siberia and in North America. It is closely allied to *A. Sturmi*, Payk., one of our most abundant water-beetles, but amongst other differences the much narrower form is sufficient for the detection of the rarer species. There is little doubt that a further search will reveal the presence of this interesting northern insect in other of our upland districts.

J. N. HALBERT.

Beetles, etc., from Ardmore, Co. Waterford.

The following is a list of Coleoptera and Hemiptera-Heteroptera taken at Ardmore, Co. Waterford, close to the Blackwater estuary, in the month of September, 1896. At the time I made a few notes, added below. I have to thank Mr. Halbert for many of the determinations.

COLEOPTERA.—*Leistus fulvibarbis*, *Dromius nigriventris*, *Aleochara algarum*, *Philonthus bimaculatus*, *P. fimetarius*, *P. scybalarius*, *Xantholinus glabratus*, *X. linearis*, *Sunius diversus*, *Stilicus rufipes*, *S. affinis*, *Ocyphus compressus*, *O. morio*, *Lathrobium multipunctum*, *Aphodius punctato-sulcatus*, *A. contaminatus*, *Onthophagus fracticornis*, *Geotrupes typhaeus*, *Timarcha violaceo-nigra*, *Chrysomela staphylea*, *C. polita*, *Galerucella tenella*, *Meloe proscarabaeus*, *Apion minutum*, *Rhynchites germanicus*, *Otiorrhynchus monticola*, *O. scabrosus*, *O. rugifrons*, *O. ligneus*, *Sciaphilus muricatus*, *Strophosomus coryli*.

HEMIPTERA-HETEROPTERA.—*Pentatomia baccarum*, *Piezodorus lituratus*, *Syromastes marginatus*, *Nabis lativentris*, *Rhopalotomus ater*.

Nearly all the species taken are common and generally distributed, but some occurred in rather an unusual habitat. *Aleochara algarum*, Fauv., usually found on seaweed above high water mark, was abundant on the cliffs at Ardmore Head and Ardginna. *Timarcha violaceo-nigra*, De G., a distinctively southern insect, occurred in numbers at one spot, at Glen-corran, where a small stream has cut a passage through the cliffs. *Meloe proscarabaeus*, L., not often captured in the perfect form in the autumn, occurred in the woods at Paulsworth, and I picked up *Geotrupes typhaeus*, L., on the shore near the same place.

As to the Hemiptera I have nothing to note except that *Syromastes marginatus*, L., another southern insect, was abundant on Ling at Crobally.

H. GORE CUTHBERT.

MOLLUSCA.

Mollusca of Ballycastle District.

If Mr. Standen and his friends were able to examine the South-west of Ireland as thoroughly as they have done the surroundings of Ballycastle, their efforts would probably be rewarded by the discovery of some species new to the British Fauna. The "pockets" described by Mr. Standen in last month's *Irish Naturalist*, would have been passed over by an ordinary observer, and we should be grateful to him for the extreme care with which he has pursued his investigations in Ireland. We hope he will continue them this year.

I quite agree with Mr. Standen's remark about *Helix costata*. Since writing my account of the Irish L. & F. Mollusca, I have also come to the conclusion that *H. costata* and *pulchella* should be regarded as two distinct species and not as varieties of one another.

R. F. SCHARFF.

*AMPHIBIANS.***Is the Frog a Native of Ireland?**

My friend Dr. Scharff says—in a note in the *Irish Naturalist* for February, 1897—that “the Irish Frog is silent—even during the breeding season it calls its mate in a scarcely audible voice.” If he will come out here in March on a sunny day he will hear the frogs in the pond at a distance of quarter of a mile, provided the wind be favourable. I dare say they number 500, and, extraordinary as it may seem, I recollect on one occasion mistaking the sound of 500 croaking frogs for the noise of a railway train passing over the bridge at Bray River three miles distant—a noise heard distinctly here in easterly winds.

Dr. Scharff's arguments in favour of an indigenous Irish frog are not convincing. My old and valued friend, the late Mr. A. G. More, never wavered from his opinion that it is one of our introduced vertebrates.

RICHARD M. BARRINGTON.

*BIRDS.***The White-fronted Goose near Roscrea.**

My friend, Mr. H. C. White, of Charleville, Roscrea, shot a fine specimen of the White-fronted, or Laughing Goose (*Anser albifrons*) on January 6th. It was beautifully marked, and measured about 2 feet 6 inches, and weighed about 7 pounds. It was one of a large flock and was shot not far from above address near Borris-in-Ossory. I saw a Brambling at Borris-in-Ossory about the 9th January.

R. M. MILLER.

*MAMMALS.***Irish Bats.**

Mr. Jameson in his notice of the Bats of Ireland, ante p. 34, has overlooked Galway as a locality for *Vespertilio Nattereri*, Kuhl. If he refers to *I. Nat.*, vol. iii., p. 116, he will see a record of my capture of this species at Clonbrock. The specimen I presented to the Museum of Natural History. I may also add that some species of bat, probably the *Pipistrelle*, is common on the Blasket Islands. The Long-eared bat is almost as common as the former in the Co. Monaghan, and in Leitrim about Mohill. I have also shot them at Bundoran in Donegal years ago, and they are common about Kenmare, Co. Kerry.

W. F. DE V. KANE.

*GEOLOGY.***The Preservation of Erratic Blocks.**

In connection with the subject of the preservation of the boulders in the vicinity of Dublin so ably treated of in the February number of the *Irish Naturalist*, it may be well to call attention to the granite blocks resting on the Cambrian rocks of Bray Head, and to express a hope that Lord Meath's attention may be called to the advantage, in the interests of science, of preserving these great geological curiosities by giving directions that they should not be disturbed. Otherwise we may expect to see them some day broken up to build walls, &c.

J. NOLAN.

IRISH PLANTS,
COLLECTED CHIEFLY IN THE PROVINCE OF
LEINSTER IN 1896.

BY R. LLOYD PRAEGER, B.E.

THE following paper refers to the more noteworthy plants collected by myself in Queen's Co., King's Co., Kildare, Meath, and Louth, during last summer; and I have added a few rare Wicklow plants observed during the last few years, and one or two stray notes from other counties hitherto unpublished. Plants found in 1896, of which record has already been made in these pages—such as *Medicago sylvestris*, the results of the Clonbrock and Cavan Excursions, and various short notes—are not mentioned here. I have set down only such stations as furnish an extension of range, or a confirmation of old records, or evidence as to the indigenousness of doubtful natives. My best thanks are due to Messrs. H. and J. Groves, Rev. E. S. Marshall, Rev. W. M. Rogers, and Mr. F. Townsend, for identifying critical plants of the groups with which their names are associated; and I am under deep obligations to Mr. Arthur Bennett, for going through a very large number of specimens—indeed it is no exaggeration to say that all the plants in my list, with the exception of well-marked and non-variable species, have passed through his hands. To Mr. N. Colgan also I am indebted for kindly checking my records with the MS. of the forthcoming new edition of *Cybele Hibernica*, thereby avoiding the useless publication of stations already known, and determining which district-records were new.

The best plant in my list is *Poa palustris*, L., of which the only previously-known British station was the banks of the River Tay below Perth, where it was found by Mr. Wm. Barclay in 1889 (*Journ. Bot.*, xxvii. 273, 1889). It has a wide distribution in Europe, from Scandinavia to Turkey, and from France to Mid-Russia; so that its rarity in the British Isles, not its occurrence there, is the remarkable feature. *Polygonum mite* is likewise an addition to the Irish flora. Its European distribution is almost as wide as that of the

last-named, and in Britain it ranges from Devon to York. The following is a summary of new district-records :—

DISTRICT III.

<i>Ranunculus trichophyllum.</i>	<i>Mentha gentilis.</i>
<i>Fumaria muralis.</i>	† <i>M. piperata.</i>
<i>Geum intermedium.</i>	<i>Calamintha Acinos.</i>
<i>Pyrus Aria.</i>	<i>Juncus obtusiflorus.</i>
<i>Anthemis nobilis.</i>	<i>Carex filiformis.</i>
<i>Arctium intermedium.</i>	<i>Glyceria plicata.</i>
<i>Erythaea pulchella.</i>	<i>Lastrea spinulosa.</i>

DISTRICT IV.

<i>Epilobium angustifolium.</i>	<i>Arctium intermedium.</i>
<i>Galium ochroleucum.</i>	

DISTRICT V.

<i>Lathyrus palustris.</i>	<i>Potamogeton Zizii.</i>
<i>Callitricha obtusangula.</i>	<i>Lastrea spinulosa.</i>
* <i>Epilobium roseum.</i>	<i>Carex aquatilis.</i>
<i>Arctium majus.</i>	<i>Poa palustris.</i>
<i>Centunculus minimus.</i>	

DISTRICT VI.

* <i>Diplotaxis muralis.</i>	<i>Nitella opaca.</i>
<i>Rubus hirtus.</i>	

DISTRICT VII.

<i>Fumaria muralis.</i>	<i>Mentha sativa.</i>
<i>Hypericum dubium.</i>	<i>Carex laevigata.</i>
<i>Chærophylloides temulum.</i>	<i>Equisetum hyemale.</i>
* <i>Valerianella rimosa.</i>	<i>Nitella opaca.</i>

DISTRICT X.

† <i>Mentha gracilis.</i>	<i>Polygonum mite.</i>
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DISTRICT XII.

<i>Glyceria plicata.</i>

The present paper is the first-fruits of a systematic survey, which I hope to carry out, of the flora of the less-known Irish counties, with a view to the eventual publication of a Topo-

graphical Botany of Ireland, of which we stand in much need. The new edition of *Cybele Hibernica*, the publication of which is so anxiously looked forward to, will go far to supply the information relative to plant-distribution in Ireland which is at present difficult to obtain. Supplemented by a county-census, on the lines which I have indicated in these pages (vol. v., pp. 29-37, 1895), the botany of Ireland may at length take its due place in works purporting to deal with the flora of the British Isles, and no longer be conspicuous only by its absence, as in the census-numbers in the *London Catalogue*.

The only group of Irish plants whose county-distribution has so far been published are the *Characeæ*. For these I give stations only where these constitute new county-records.

Ranunculus circinatus, Sibth.

III. QUEEN'S—canal at Portarlington.

V. MEATH—canal at Enfield; Lough Crew near Oldcastle.

R. trichophyllus, Chaix.

III. QUEEN'S—Maryborough.

Aquilegia vulgaris, Linn.

III. QUEEN'S—banks west of Portarlington.

VII. KING'S—abundant in meadows and on banks about Clonad Wood, and on limestone cliffs N.W. of Philipstown.

Commonly found in suspicious situations, but appears truly wild in these stations.

***Papaver somniferum**, Linn.

V. MEATH and LOUTH—appears quite established on the extensive sandhills that stretch for some miles north and south of the mouth of the Boyne.

Neckeria claviculata, N.E. Br.

IV. WICKLOW—rocks at the west side of Luggela lake, 1894. A confirmation of Templeton's record, a century old.

Glaucium flavum, Crantz.

V. LOUTH—abundant on shores north of Dunany and below Castle-bellingham.

Fumaria muralis, Sonder.

III. QUEEN'S—Maryborough esker.

V. MEATH—Oldcastle and Trim. LOUTH—Boyne mouth and Dunany.

VII. KING'S—common about Edenderry.

†**Sisymbrium Sophia**, Linn.

V. KILDARE—Kilcock. LOUTH—Anagassan and Blackrock. On waste ground in the neighbourhood of houses, but apparently established.

†**Brassica Sinapoides**, Roth.

IV. WICKLOW—hedgebank between Greystones and the railway station, 1894, and still there.

***Diplotaxis muralis**, DC.

V. MEATH—Laytown.

VI. N.E. GALWAY—railway outside Galway terminus.

†Silene noctiflora, Linn.

V. MEATH—plentiful in a sandy waste field west of Mayden Tower.

Elatine hexandra, DC.VIII. W. GALWAY—Craigduh Lough, Roundstone, with *Naias flexilis*.**Linum angustifolium**, Huds.

V. KILDARE—rough banks near Leixlip railway station.

Lavatera arborea, Linn.

IV. WICKLOW—steep rocks at south end of Bray Head, 1894, and still there.

Hypericum dubium, Leers.

III. QUEEN'S—banks at Emo and Maryborough.

IV. WICKLOW—below Woodenbridge, near Clara bridge, and by St. Saviour's Priory at Glendalough, 1894.

VII. KING'S—Clonad Wood near Tullamore.

†Erodium moschatum, L'Hérit.

VII. KING'S—roadside at Killeagh, an escape.

***Mellotus arvensis**, Wallr.

V. LOUTH—about Termonfeckin and Queensboro'.

Vicia angustifolia, Linn.

X. CAVAN—base of Slieve Glaah. Very rare inland.

Trifolium medium, Linn.

III. QUEEN'S—Emo and Portarlington.

IV. WICKLOW—near Enniskerry.

V. MEATH—Navan.

T. striatum, Linn.

IV. WICKLOW—dry pasture behind Greystones railway station, 1894, and still there.

T. fragiferum, Linn.

V. MEATH—by the Boyne at Mornington. LOUTH—By the Boyne above Queensborough, and by the shore at Clogher. The last-named appears to be its northern east-coast limit.

T. filiforme, Linn.

IV. WICKLOW—dry pasture behind Greystones railway station, 1894, and still there.

Lathyrus palustris, Linn.

V. MEATH—plentiful on the shore of Lough Sheelin, near the West-meath boundary.

Rubus hirtus, W. and K.

VI. N.E. GALWAY—Killasolan near Clonbrock. "A remarkable form," W. M. Rogers.

Geum Intermedium, Ehrh.

III. QUEEN'S—wood south of Maryborough.

Potentilla procumbens, Sibth.

X. CAVAN—near Cavan town.

Pyrus Arria, Bhrh.

III. QUEEN'S—among native wood (Oak, Ash, Hazel) on Maryborough esker, and among Birch west of Portarlington; a native here.
 VII. KING'S—in Derryadd wood, hedges near Philipstown, and on limestone rocks 4 miles N.W. of Philipstown; appears to be native in this district.

Myriophyllum verticillatum, Linn.

III. QUEEN'S—Mountmellick.
 V. MEATH—Lough Sheelin and Athboy.

Callitricha obtusangula, Le Gall.

V. KILDARE—ditch at Maynooth.

C. autumnalis, Linn.

X. TYRONE—Omagh and Strabane, Miss Knowles.

Epilobium angustifolium, Linn.

IV. WICKLOW—on high cliffs overlooking the S.W. shore of Lough-nahanagan. A new record for this rare plant in District IV., as the old "Scalp" record has been abandoned.

†E. roseum, Schreb.

V. LOUTH—growing with *E. obscurum* on a wet wall near Queensboro'. Of another specimen from the same station, Rev. E. S. Marshall writes, "I believe *E. obscurum* x *roseum*, upon the whole nearer to *roseum*."

Cicuta virosa, Linn.

V. MEATH—Lough Crew near Oldcastle.

Chærophylloides temulum, Linn.

V. KILDARE—Thomastown. MEATH—Laytown, Drogheda, Kilmessan, Bective, Navan. LOUTH—Louth and Togher.

VII. KING'S—Edenderry.

X. CAVAN—Mount Nugent.

In all cases in shady hedge-banks, often in considerable quantity. I see no reason to doubt its being indigenous.

†Anthriscus vulgaris, Bernh.

V. MEATH—Peter and Paul Abbey near Trim. LOUTH—on Louth Abbey.

VII. KING'S—about Philipstown.

In its few inland stations, it haunts old buildings and dry roadsides, and its rank is doubtful.

Cornus sanguinea, Linn.

VII. KING'S—in hedges four miles west of and also one mile north of Philipstown, probably the remnants of native stock.

Valeriana Mikanii, Syme.

V. MEATH—Lough Crew demesne. Out of perhaps a hundred Valerians examined in 1896, this plant alone was good *Mikanii*, though many plants approaching this form were found. *V. sambucifolia* is the common Irish plant.

***Valerianella rimosa, Bast.**

VII. KING'S—in a potato field at Edenderry. A weed of cultivation.

Rubia peregrina, Linn.

IV. WICKLOW—steep rocks, south end of Bray Head.

Gallium Mollugo x verum (= *ochroleucum*, Syme).

IV. WICKLOW—dry pasture behind Greystones, 1893.

Dipsacus sylvestris, Huds.

V. MEATH—dry banks at Bective and Laytown. LOUTH—rough banks by the Boyne about the Obelisk, and near Queensboro'. Existing records for District V. appear to be confined to Co. Dublin.

Filago minima, Fr.

V. MEATH—damp sandy ground behind the light-houses at Boyne-mouth, with *Centunculus*.

Anthemis nobilis, Linn.

III. QUEEN'S—abundant on the Great Heath of Maryborough, and no doubt indigenous.

***A. arvensis**, Linn.

IV. WICKLOW—in a meadow near Greystones—introduced with grass seed.

Matricaria Chamomilla, Linn.

V. KILDARE—near Edenderry. MEATH—Kilmessan. Hanging suspiciously about roadsides and farm-houses; apparently not yet established in this part of Ireland.

Senecio Jacobaea, Linn. var. b. **flosculosus** (Jord.)

V. LOUTH—Immensely abundant from the Boyne to Clogher, covering hundreds of acres of sandhills and pasture; the normal form completely absent. Threlkeld recorded it from this locality a hundred and seventy years ago.

S. erucifolius, Linn.

V. KILDARE—north of Leixlip railway station. MEATH—at Laytown, and a mile south of it.

The range of this interesting plant is thus extended into Kildare and Meath, but it only crosses the county boundary by a few miles, and is to all intents confined to Co. Dublin. The verification of Dr. Moore's record "between Drogheda and Dundalk" is very desirable.

Carduus pycnocephalus, Linn.

III. QUEEN'S—Maryborough esker.

V. KILDARE—Carbury. MEATH—Enfield, Bective.

VII. KING'S—Edenderry, Philipstown.

Though rare inland, this thistle turned up in a number of places, chiefly esker-ridges and gravelly places, often with *C. crispus*. It appeared to grow where suitable ground existed, and was not confined to the neighbourhood of houses.

Arctium majus, Bernh.

V. DUBLIN—roadside near St. Doulough's. MEATH—near Oldcastle.

LOUTH—waste place at Blackrock.

X. CAVAN—roadside near south-east end of Lough Ramor.

The claims of this species as an Irish plant hitherto rested

on a specimen I collected in Armagh (*I. N.*, 1893, p. 133). It is satisfactory therefore to have the above additional records which are verified by Mr. A. Bennett.

A. minus Bernh. var. **paniculatus**, Lange.

III. QUEEN'S—Maryborough.
V. LOUTH—Baltray, Castlebellingham.

A. Intermedium, Lange.

III. QUEEN'S—Maryborough.
IV. WICKLOW—wood near Enniskerry.
V. MEATH—Laytown and Mornington. LOUTH—Togher and Clogher.

Carduus crispus, Linn. var. b. **polyanthemos** (Koch.)

III. QUEEN'S—Maryborough.

‡**Cichorium Intybus**, Linn.

V. LOUTH—very common in fields and waste ground by the sea about Termonfeckin and below Togher; the only place I have seen it in Ireland where it looked naturalised.

Picris echioides, Linn.

V. MEATH—gravelly banks at Laytown. Previous District V. records confined to Dublin.

***Crepis taraxicifolia**, Thuill.

III. QUEEN'S—roadside at Maryborough.
V. KILDARE—Leixlip.

Spreading westward.

Leontodon hispidus, Linn.

III. QUEEN'S—Portarlington and Emo.
V. KILDARE—Maynooth and Carbury. MEATH—Athboy and Lough Sheelin.

VII. KING'S—Geashill.

We do not yet know the distribution of this and *L. hirtus* in Ireland.

Centunculus minimus, Linn.

V. MEATH—damp sandy ground behind the lighthouses at Boyne-mouth. Apparently not known previously from any station between Co. Cork and Co. Down.

Fraxinus excelsior, Linn.

The curious sport *F. monophylla* Desf. = *F. heterophylla* Willd., with large undivided ovate leaves, was gathered in a rough hedge near Portarlington, Queen's Co., and in a similar situation near Togher, Louth, apparently wild.

Erythraea pulchella, Fr.

III. QUEEN'S Co.—Dry pasture at Emo. Apparently the only inland station in Ireland.

Myosotis collina, Hoffm.

V. MEATH—wall by roadside near Boyne monument.

Cuscuta Trifolii, Bab.

V. LOUTH—on sandhills near Baltray, at the mouth of the Boyne; and on sandy shore below Lurgan Green, growing on *Lotus*, &c. Threlkeld's old record for " *Cuscuta major*," " Mayden Tower," I

have vainly tried to confirm; no Dodder appears to grow there now. The first station mentioned above, however, is just on the opposite side of the river, not a mile from Mayden Tower, so it appears probable that this was the plant Threlkeld found.

VI. CLARE—abundant on fields east of Killeany and at Portmurvy, Great Island of Aran, 1895. This is the plant recorded as *C. Epithymum* in report of Galway Field Club Conference (*I.N.* iv, 251), and is, I believe, the plant recorded under the same name by Messrs Nowers and Wells in *Journ. Bot.*, June, 1892, as it grows exactly in the stations described by them. Since publishing the Botany of the Galway Excursion, I grew suspicious of this Dodder, and Mr. Arthur Bennett has confirmed my belief that it is *C. Trifolii*, not *C. Epithymum*.

Linaria vulgaris, Mill.

IV. WICKLOW—on ditches and in fields about Rathnew. I believe indigenous here.

L. viscosa, Moench.

III. QUEEN'S—in potato fields at Emo.

V. MEATH—cultivated land near Carbury.

Common along the Great Western Railway and its branches, but seldom found elsewhere. Both the above stations were far from the railway.

Euphrasia officinalis, Linn.

The following segregate forms have been kindly named by M. F. Townsend:—

E. Rostkoviana, Hayne.

III. QUEEN'S—Emo.

V. MEATH—Oldcastle.

E. borealis, Townsend.

V. MEATH—Laytown.

E. gracilis, Fr.

V. MEATH—Oldcastle.

E. brevipilla, Burnat and Gremli (Wetts).

V. KILDARE—Leixlip. MEATH—Laytown. LOUTH—Toher and Lurgan Green.

VI. N.E. GALWAY—Clonbrock.

VII. KING'S—Edenderry.

IX. SLIGO—Inismurray.

X. TYRONE—Mullaghcarn, Miss Knowles. CAVAN—Mount Nugent

Mentha piperata, Linn.

III. QUEEN'S—By the stream below Maryborough, probably an escape

M. sativa, Linn.

VII. KING'S—Edenderry.

M. gracilis, Sm. var. b. **cardiaca**, Baker.

X. CAVAN—on the wild stony shore of Virginia Water, far from any house, but it is not admitted as a native of Ireland.

M. gentilis, Linn. var. c. **Pauliana** (F. Schultz).

III. QUEEN'S—by the Mountmellick canal a mile above Portarlington.

Quite wild here, and *looked* indigenous; when Irish Mints are worked out, this species may prove to be a native; it is not uncommon throughout England, and does not appear to be cultivated in this country.**Salvia Verbenaca**, Linn.

V. LOUTH.—A large colony on the edge of the Boyne above Queensboro'.

Calamintha arvensis Lam. (= *C. Acinos*, Clairv.)

III. QUEEN'S—three stations near Maryborough:—sparingly by the roadside a mile towards Stradbally; on the esker south of the railway; and abundant on the esker north of the railway. If not indigenous in this district, it is certainly very well established.

Stachys palustris x sylvatica.

IV. WICKLOW.—Glen of the Downs.

V. KILDARE.—Hedges near Leixlip railway station. MEATH.—Roadside near Oldcastle. LOUTH.—Roadside near Togher.

Hybrids in all cases nearer *S. palustris*.**Chenopodium rubrum**, Linn.

V. MEATH.—Abundant in marshy meadows below the railway bridge at Drogheda; more sparingly near Mayden Tower. LOUTH.—Alleys in Drogheda on the south side of the river; plentiful about Baltray.

Atriplex laciniata, Linn. (= *A. arenaria*, Woods.)

V. LOUTH.—Sands at the mouth of the Boyne.

A. portulacoides, Linn.

V. LOUTH.—Steep rocks at Clogher Head.

Polygonum minus, Huds.

III. QUEEN'S.—Wet hollows on the Great Heath of Maryborough.

X. CAVAN.—Plentiful on the shore of Virginia Water.

P. mite, Schrank.X. CAVAN.—On the stony shore of Lough Ramor, growing with *P. minus*, among which it could be distinguished by its larger size, broader leaves, and thicker spikes.**P. Convolvulus**, Linn. var. **subalatum**, V. Hall.

V. LOUTH.—Mouth of the Boyne.

Taxus baccata, Linn.

VII. KING'S.—A few old bushes in Clonad Wood near Tullamore, possibly the remnants of native stock.

Orchis Morio, Linn.

V. LOUTH.—In one meadow at Killencoole: the most northerly station to which I have so far traced this Orchid in Ireland.

VIII. W. GALWAY.—Frequent in the Roundstone district.

Neottia Nidus-avis, Rich.

IV. WEXFORD.—Glen half-a-mile inland from Courtown Harbour.

***Listera cordata*, R. Br.**

V. MEATH.—Bog on the shore of Lough Sheelin, near the Westmeath boundary, 230 feet above Ordnance Survey datum.

***Malaxis paludosa*, Sw.**

V. KILDARE.—A good colony on a wet bog two miles south of Thomastown.

***Allium vineale*, Linn.**

V. LOUTH.—Banks by the Boyne above Queensborough.

***Juncus obtusiflorus*, Ehrt.**

III. QUEEN'S.—Near Emo, and near Portarlington,

V. LOUTH.—Salt marsh at Soldier's Point.

***Lemna gibba*, Linn.**

V. MEATH.—Drains by the Boyne below Drogheda. LOUTH.—In immense abundance in an artificial lake at Beaulieu House, near Queensborough.

***Potamogeton angustifolius*, Presl. (= *P. Zizii*, Roth.)**

V. MEATH.—In the Boyne at Bective, plentiful.

***P. densus*, Linn.**

VII. KING'S.—In the Kilbeggan canal.

***P. interruptus*, Kit. (= *P. flabellatus*, Bab.)**

VII. KING'S.—In the Grand Canal near the boundary of Co. Kildare, a mile south of Edenderry.

***Zostera nana*, Roth.**

V. MEATH.—Estuary of the Nanny River, above the bridge at Laytown.

***Eleocharis acicularis*, R. Br.**

V. MEATH.—Canal at Enfield. LOUTH.—Pool near Clogher.

VII. KING'S.—Canal near Philipstown and Edenderry.

X. CAVAN.—In Lough Oughter.

***E. uniglumis*, Reichb**

V. LOUTH.—Salt-marsh at Soldier's Point.

***Cladium jamaicense*, Crantz.**

V. MEATH.—Shore of Lough Sheelin, near the Westmeath boundary.

***Carex curta*, Good.**

V. MEATH.—Bog near Navan. Apparently no other recent record from District V.

***C. acuta*, Linn.**

V. MEATH.—In the Boyne at Beauparc and Navan.

X. CAVAN.—Killykeen on Lough Oughter.

***C. aquatilis*, Wahlenb.**

V. MEATH.—In the River Blackwater, near the Cavan boundary.

X. CAVAN.—Abundant in the River Blackwater, between Lough Ramor and the Meath boundary.

The Blackwater plant comes nearest var. *virescens*, Anders.—

A. Bennett).

C. Ilmosa, Linn.

V. KILDARE.—Bog two miles south of Thomastown. MEATH.—In bogs near Carbury, and between Athboy and Navan.
These appear to be the only recent records for this sedge in District V.

C. Iævigata, Sm.

VII. KING'S.—Clonad Wood near Tullamore.

C. Iffliformis, Linn.

III. QUEEN'S.—Marsh near Maryborough.

C. Pseudo-cyperus, Linn.

III. QUEEN'S.—By the canal at Mountmellick.

V. MEATH.—Bog-drains by canal three miles E.N.E. of Enfield, close to the Kildare boundary.

No recent record from either of these Districts.

Festuca uniglumis, Soland.

V. LOUTH.—Sandhills at Baltray—the most northern station in Ireland.

Glyceria plicata, Fr.

III. QUEEN'S.—Maryborough.

V. KILDARE.—Carbury and Leixlip. MEATH.—Oldcastle, Bective, and Boyne-mouth. LOUTH.—South of Soldiers' Point.

X. CAVAN.—Edge of Lough Ramor.

XII. LONDONDERRY.—Ditch near Formoyle Hill.

Will probably be found throughout Ireland.

Poa palustris, Linn.

V. MEATH.—on the reedy northern edge of the Boyne at Beauparc, among *Carex acuta*, *Thalictrum flavum*, &c.

†Bromus secalinus, Linn.

V. LOUTH.—About Queensborough.

B. racemosus, Linn.

V. LOUTH.—At Soldiers' Point, in old pasture.

B. commutatus, Schrad.

III. QUEEN'S.—Native near Maryborough.

X. CAVAN.—Shores of Lough Ramor.

Lastrea Oreopteris, Presl.

VII. KING'S.—Sparingly in Clonad Wood near Tullamore, at 250 feet elevation.

L. spinulosa, Presl.

III. QUEEN'S.—Woods south of Maryborough.

V. KILDARE.—Bog south of Thomastown. MEATH.—Bog between Athboy and Navan; near Oldcastle, and on edge of Lough Sheelin.

X. CAVAN.—Bog near Lough Sheelin.

Osmunda regalis, Linn.

V. KILDARE.—Very sparingly on bog south of Thomastown. MEATH.—One plant in bog three miles E.N.E. of Enfield.

VII. KING'S.—By the river at Clonad Wood near Tullamore.

Equlsetum variegatum, Schleich, var. **majus**, Syme.

III. QUEEN'S—In marshy ground in several spots near Maryborough.
 VII. KING'S—Bank by the Tullamore River near the bridge at Ballinagar, and abundant by the Kilbeggan branch of the Grand Canal.

The head-quarters of this plant appear to be in the Central Plain. Thence it has spread all along the Royal Canal, right to the boundary of the city of Dublin.

E. hyemale, Linn.

VII. KING'S—On the edge of the stream below the bridge at Clonad Wood near Tullamore.

Chara fragills, Desv.

III. QUEEN'S—Maryborough (var. *delicatula*).

V. KILDARE—canal at Leixlip and Kilcock. MEATH—canal at Enfield; in Lough Crew near Oldcastle. LOUTH—Soldier's Point (var. *capillacea*), Killencóole.

X. TYRONE—Favour Royal, Mrs. Leebódy (var. *delicatula*).

C. aspera, Willd.

V. MEATH—Oldcastle.

VII. KING'S—Edenderry, and in the Kilbeggan branch of the Grand Canal.

C. polyacantha, Braun.

V. MEATH.—in Lough Crew near Oldcastle.

C. contraria, Kuetz.

V. MEATH—near Oldcastle.

VII. KING'S—Edenderry, in the canal.

IX. ROSCOMMON—in the River Suck at Bellagill bridge.

X. CAVAN—in Lough Sheelin.;

C. hispida, Linn.

III. QUEEN'S—canal at Portarlington (var. *rudis*).

V. KILDARE—canal at Maynooth and Kilcock (var. *rudis*). MEATH—Lough Crew near Oldcastle (type and var. *rudis*), canal at Enfield (var. *rudis*).

VII. KING'S—canal at Edenderry (var. *rudis*).

X. CAVAN—Lough Sheelin (var. *rudis*).

C. vulgaris, Linn.

V. KILDARE—near Carbury (var. *longibracteata*). MEATH—near Oldcastle (var. *longibracteata*).

VII. KING'S—near Clonad Wood, and in the Kilbeggan branch of the Grand Canal.

X. CAVAN—near Cavan town.

Nitella opaca, Ag.

V. MEATH—Oldcastle.

VI. N.E. GALWAY—old well at Clonbrock.

VII. KING'S—Tullamore River below Geashill.

X. CAVAN—near Cavan town.



FIELD DAYS IN ULSTER.

BY THE REV. HILDERIC FRIEND.

II.—ANTRIM AND COLERAINE.

ON Wednesday, May 27th, I was up betimes. I could not understand how it was that everybody was so much behind time. Hurrying to the station I missed my way, and came at last to the right spot only to find that instead of missing my train I still had a quarter of an hour to wait. At last it occurred to me that I had been gaining time by crossing the Irish Channel, and had not put my watch right with Dublin. I did so, then proceeded to Antrim for Lough Neagh. It was a delightful day, and I greatly enjoyed the run. Arriving at my first halting-place I left all my travelling baggage at the station, and at once set to work. On the way down to the quiet little town I found a heap of manure in front of the Hall used by Orangemen. This yielded me a couple of white worms (*Enchytraeids*), such as are usually associated with such material.

I soon discovered that my movements were regarded with some suspicion. Pushing my way towards the Lodge connected with the residence of Viscount Massereene, I found on the left a short dirty lane running down to the river. Here I fancied I should find a heap of treasures. It was apparently the exact locality. I turned over the humid soil, pulled up the weeds, examined their roots, and pried into every spot which could be the conceivable home of an annelid, but without avail. Not a solitary specimen could I find, save the ubiquitous green-worm (*Allolobophora chlorotica*), and a horse-leech. I made my hands as decent as possible after my dirty exploit and returned to the main street to fall into the hands of a policeman, who politely informed me that there was to be a ball-firing display or contest by the shores of the Lough, and if I would like to get photographs the opportunity would be a good one.

I now hastened to the Lough—not to photograph flying bullets, but to seek for trophies. I believe much good work might be done here by any one living on the spot, and I trust some reader of the *Irish Naturalist* who resides near Lough Neagh will favour me with specimens of the fresh-water

worms to be found there. On pulling up some tufts of grass by the shores of the lake I discovered what appeared, even to my practised eye, to be a pretty annelid. I was surprised to find that the specimens ranged in colour from pure white to pink and salmon colour, a phenomenon I had not before observed in worms of one species. I collected a goodly number, and was amused a few days after when I opened my collection to find that they had all assumed wings! My annelids were the larvae of a pretty minute fly (Diptera), but I was unable at the time to recapture them for identification. These flies may therefore be regarded as having been evolved from worm-like ancestors of aquatic predilections. Under the stones I found a few black leeches of minute dimensions, and a small white *Nephelis*. A little further research brought to light a beautiful worm belonging to the family of *Tubificidae*. It was eventually found to belong to the genus *Psammoryctes*, and will probably prove to be new to science. It is scarce in the locality which I examined, but may be more abundant elsewhere. About an inch long, red, slender, it lives in the roots of partly submerged grass and water plants, and can only be seen by patiently examining the plants with a lens. I believe that if ooze from the lake could be collected from a boat or dredge other species would be obtained, while the feeders of the lough would be sure to supply others.

Having spent as much time here as I could afford I returned to the station. On inquiring for the Round Tower I found that it was locally known as the steeple. The gate posts all round this locality are all miniature "steeples," showing how the mimetic art attaches even to man. Riding from Antrim to Ballymena I observed that the Cotton-grass was abundant in the peaty bottom. Alighting at Coleraine I proceeded at once to the backwater, a few hundred yards from the station, where I was rewarded by the immediate discovery in the ooze of a large number of worms belonging to the *Tubificids*. The dam here is an excellent hunting ground for fresh-water worms, but I unfortunately had no introduction to any lady or gentleman interested in natural history in Coleraine, and could not therefore initiate any one into the mysteries of the art of collecting. I believe I obtained two or three species of aquatic worms here, but as my specimens had to be killed and

preserved owing to my inability to work up all my gleanings in a living state I have not yet determined all the species. I shall be glad to hear of some one who will help me to obtain fresh material from this part of the country.

As the special facilities for tourists are not provided till June 1st, I was a few days too early for these conveniences. This was in most instances an advantage, as it saved me from being the gazing-stock of an idle crowd, always on the look-out for the ludicrous; it had, however, in this instance, its drawbacks, for the conveniences for visiting Portrush and the Causeway were inadequate, and I was consequently unable to do any work at those places worthy of placing on record. I saw various localities which struck me as specially suitable for aquatic annelids, and in the event of another visit shall know where to turn my attention.

My next destination was Derry. The run thence from Coleraine was full of interest, and the locality, under the genial and enthusiastic guidance of my kind host, proved an admirable hunting-ground. A report of my finds here must, however, be reserved for my next paper. Meanwhile I shall be very grateful if the reader will seek for specimens of aquatic worms under stones, waterweeds, algae, mud, and elsewhere, and forward the same to me at Ocker Hill, Tipton, Staffs.

OBITUARY.

HENRY NEWELL MARTIN.

We should have noticed earlier the premature death of this famous Irish biologist, who was born at Newry in 1848. After brilliant university courses at London and Cambridge, acting at the latter as demonstrator to Prof. Michael Foster, he became assistant to Huxley, in collaboration with whom he produced the well-known "Practical Biology." In 1876 he accepted the professorship of biology in Johns Hopkins University, Baltimore, U.S.A., where he carried out many valuable physiological researches, wrote several text books, and trained a number of talented pupils. In 1893 his health failed; he resigned his chair and returned to England, where it was hoped he might have regained strength. But he gradually became weaker and passed away at Burley-in-Wharfedale, Yorkshire, on October 27th of last year.

LEUCANIA UNIPUNCTA, HAW. IN CO. CORK.

BY W. F. DE V. KANE, M.A., F.E.S.

Leucania unipuncta, Haw. (*extranea*, Gn.) has been taken a second time in Ireland. The first record is that of the Hon. R. E. Dillon, who captured one specimen at Clonbrock, Co. Galway, at sugar in September some years ago, in whose cabinet it is preserved. Lately I received an example of the same insect from Mr. R. J. F. Donovan, a younger brother of Dr. C. Donovan, now abroad, whose collections at Glandore, Co. Cork, and that neighbourhood, proved of great service in extending our knowledge of the distribution of interesting species and varieties of Lepidoptera on the little-known south coast of Ireland. Mr. R. J. F. Donovan is now taking up the study of this section of our Irish fauna in a locality somewhat removed from the former; namely, Timoleague and Courtmacsherry Bay. He has commenced well by taking this interesting moth at sugar on the 13th September last. The specimen is a small one, but well marked, and it now forms a part of my collection by his kindness. But few have ever occurred in Great Britain, all I believe on the south coast of England. The larva is the "army worm" of the Americans, and commits great devastations on the crops. A notice of this moth having appeared in swarms last summer on the coast of New Hampshire (Mass.) is quoted in last month's *Entomologist* from an American Entomological periodical. It appears to have an immense range of distribution—all America, Japan, China, India, Melanesia, Australia, New Zealand, Madeira, etc., but it is unknown in Continental Europe according to Staudinger. It now seems probable that it may be indigenous in Ireland, as our southern shores are to a large extent unknown and un-worked by collectors, and its occurrence in Galway quite harmonises with what we know of the similarity of the entomological fauna of the South and West.

EUPHRASIA SALISBURGENSIS, FUNK., IN IRELAND.

BY NATHANIEL COIGAN, M.R.I.A.

IN the *Journal of Botany* for November last attention was drawn to the Irish forms of *Euphrasia* by the publication of an instructive paper from the pen of Mr. F. Townsend, an acknowledged authority on this difficult genus. In this paper *E. Salisburgensis*, Funk., an alpine or sub-alpine species of wide range on the European continent, is recorded as an addition to the Irish flora on the faith of specimens gathered by the Rev. E. S. Marshall on the shores of Lough Mask, Co. Mayo, in July, 1895. The Lough Mask plant, as figured by Mr. Townsend in the plate which adds so much to the value of his paper, is obviously far from typical, but from a note in last month's issue of the *Journal of Botany* it appears that Messrs. H. and J. Groves have discovered amongst material collected in 1892 near Menlough in Co. Galway, specimens which Mr. Townsend considers much closer to the Continental plant. An elegant, slender-stemmed *Euphrasia*, gathered by myself in August, 1895, near Ballyvaughan, Co. Clare, where it grows in abundance on limestone crags, has since been kindly examined by Mr. Townsend, who unhesitatingly refers it to *E. Salisburgensis*, and informs me that it is similar to the Menlough plant.

This interesting *Euphrasia* is thus shown to range over a considerable area on the low-lying limestone tracts of West Ireland; but it cannot justly be regarded as a recent addition to our flora. The plant, in fact, was gathered in Ireland so long ago as 1852, and was recorded as Irish, under another name, in the *Cybele Hibernica* in 1866. We find it first referred to in the following passage from a paper by Daniel Oliver published in the *Phytologist* for 1854, and describing a botanical tour made in Ireland two years earlier:—

"*Euphrasia*—? On Aran I collected a curious little form some three inches in height much branched from the base, stem with a minute, adpressed pubescence, lanceolate or lanceolate-oblong leaves with one, two, or three strong teeth on each side. I did not know to what species or form to refer it, but examples being sent to C. C. Babington, he kindly informs me that he thinks it a form of the *E. gracilis* of Fries, although it strikingly resembles and possibly may be *E. Salisburgensis*."¹

¹ *Botanical Notes of a Week in Ireland* (August, 1852), Vol. IV., p. 679.

Two years later, in the *Scottish Gardener* for 1856, the same plant, this time under the name *E. gracilis*, Fries, was recorded by the late Mr. A. G. More from the limestone district of Castle Taylor and Garryland, Co. Galway. The finder, however, appears to have been dissatisfied with the naming of his plant, for four years later in his paper:—“Localities for some Plants observed in Ireland”¹, we find this further reference to it:—

“*Euphrasia gracilis* seems to belong rather to *E. Salisburgensis*; in either case it is the *E. nemorosa* of Grenier and Godron. But the Garryland (and Aran) *Euphrasia* differs much from what I have gathered as *E. gracilis* on the heaths and downs of Kent. This latter is apparently the *E. ericetorum* of Jordan; but I do not suppose that either is specifically distinct.”

It appears clearly from More’s correspondence about this time with his friends, the Rev. W. W. Newbould and Professor Babington, that he was strongly inclined to refer his Castle Taylor plant to *E. Salisburgensis*, and that he refrained from adopting that name only in deference to the opinion of the distinguished author of the *Manual of British Botany*. Through the kindness of Miss More I am enabled to make the following interesting extracts from her brother’s correspondence in illustration of this point. The MS. draft of the paper just quoted from had been submitted by More to Newbould with the name *E. Salisburgensis* set down for the Garryland *Euphrasia*, whereupon Newbould thus writes, under date April 9, 1860:—

“*Euphrasia Salisburgensis*.—I would not use this name unless you were quite sure the plant was the Continental one. If I rightly remember, you showed me the plant, and it was identical with one I gathered on the border of Loch Neagh. This plant, I thought, was not *E. Salisburgensis*, but *E. officinalis* of Koch, approaching as nearly as possible to *E. Salisburgensis*, and on mentioning this to Babington, I found that he had independently come to precisely the same conclusion.”

Shortly before this, March 19, 1860, Babington, in reply to inquiries from More, had written:—

“I do not find that I have any *Euphrasia Salisburgensis* or any other from Garryland. I have what I believe to be it from the great Isle of Aran.² I have given up *gracilis* and think that if we are to split here we must take the French view of them and leave *officinalis* and *nemorosa* to correspond with Boreau’s groups, *Calyce glanduleux* and *Calyce non-glanduleux*.”

¹ *Nat. Hist. Review*, vii., p. 434.

² Probably some of Oliver’s 1852 specimens.

And, finally, after examination of More's specimens, Babington writes, April 17, 1860:—

"I certainly think that your *Euphrasia* is the same as mine from Aran. It comes very near to *Salisburgensis*, although the true Continental plant has even more deeply jagged leaves than this. I am not inclined to separate the plant [*E. officinalis*] into segregate species."

Still dissatisfied with the uncertainty as to his Galway *Euphrasia*, More, in the following year, 1861, sent a sheet of specimens through his friend, J. G. Baker, to M. Boreau, author of the *Flore du Centre de la France*, by whom they were identified as *E. cuprea*, Jord. Under that name both the Castle Taylor and the Aran Island plants were recorded in *Cybele Hibernica* (1866), as a form of the aggregate *E. officinalis* which Babington thought it inadvisable to "split."

The precise value to be given to Jordan's specific distinctions must depend on the greater or less development of the analytic faculty in the individual student. To many otherwise gifted botanists the true analytic vision is denied; they lack that instinct of discrimination which has enabled M. Jordan in his *Espèces végétales affines* to evolve 200 species from the *Draba verna* of Linnaeus, and for such as these *E. cuprea* will remain a mere phase of *E. Salisburgensis*. Others may with Nyman rank it as a sub-species, others again with Gunther Beck as a variety, and so on through all the dwindling gradations from species down to "state." As for myself, having compared the Castle Taylor specimens named *E. cuprea* by Boreau¹ with those from Ballyvaughan, I can find no distinction of any importance. Some of the Castle Taylor specimens in their narrower leaves and more truly filiform stems and branches appear to approach closer to typical *E. Salisburgensis* than the plant from Ballyvaughan, while in the latter the more aristate toothing of the bracts comes closer to the type.

In short, the late Mr. More's Castle Taylor plant of 1854 has as good a title to a place under *E. Salisburgensis*, Funk, as those from Menlough and Ballyvaughan, and has certainly a better title to that position than the plant from Lough Mask. It was simply in deference to Babington's objection to split

¹ To one of these specimens is appended the following note in the handwriting of the late A. G. More: "Seen by Bab. same as Aran Isles" [specimen?]

E. officinalis that the Castle Taylor plant was not recorded with the dignity of a new Irish species or sub-species some 36 years ago; and that the plant was finally published in *Cybele Hibernica* as *E. cuprea* rather than as *E. Salisburgensis* was due to M. Boreau's refinement on Mr. More's diagnosis. He who records the segregate necessarily records the aggregate, and the relation between *E. cuprea* and *E. Salisburgensis* is that of segregate and aggregate.

The Irish distribution of *E. Salisburgensis* appears to be exclusively low-level. The stations Inishmore (Aran), Castle Taylor, Lough Mask, Lough Corrib (Menlough) and Ballyvaughan, all lie within 100 feet of sea-level, and if further observation should show that it occurs, as Newbould suspected it did, on the shores of Lough Neagh, then its descent to a level of 50 feet would be established.

BIRD MIGRATION.

The Migration of Birds: a Consideration of Herr Gätke's views. By F. B. WHITLOCK, London; R. H. Porter, 1897. Pp. 140, Price 3s. 6d. nett.

This is a remarkably incisive criticism of some of the theories put forward in Herr Gätke's celebrated work "Die Vogelwarte Helgoland," on the ever-fascinating subject of Bird Migration. Particularly, our author dissents from Herr Gätke's views as to the direction, altitude, and velocity of the migration-flight; and on each of these three subjects he certainly scores some telling points against the distinguished Heligolander. By far the most interesting part of Mr. Whitlock's book is that dealing with the "Direction of the migration flight;" and though a distinction must be drawn between the question with which, at the outset, he proposes to deal, and that to which, in effect, almost the whole of his reasoning is devoted, the chapter bearing this heading is beyond doubt a masterly examination of Herr Gätke's leading idea—the idea of a "broad migration column," advancing along an "undeviating" route, which is conceived to lie either *due* north and south, or (in many cases) *due* east and west, between limits corresponding in the former case to the longitudinal, and in the latter to the latitudinal, extent of the breeding area. Our author takes in detail five species—the Hooded Crow (pp. 13-21), Honey Buzzard (pp. 21-24), Shore Lark (pp. 24-29), Yellow-browed Warbler (pp. 29-32), and Richard's Pipit (pp. 32-34), all supposed by Herr Gätke to pursue the undeviating east-and-west route—and successfully shows that in every one of these instances the theory of the "broad front" lands its propounder in some absurdity.

Nor do the direct north-and-south migrants fare better. The Red-spotted Bluethroat, for instance, to which Herr Gätke assigns this route, is shown by Mr. Whitlock to be on such a hypothesis strangely out of place in its annual visits to Heligoland, having no ascertained winter home west of Egypt; while with reference to the Red-throated Pipit (*Anthus cervinus*), Herr Gätke's statement that it "adheres to a most rigid southerly course" is pertinently contrasted with a passage in Collett's "Bird Life in Arctic Norway," stating as distinctly that in spring it follows "the eastern route across Russia and the Baltic provinces." At the same time it must be pointed out that our author is no friend to "eastward migration" on any extensive scale, and, at the commencement of the chapter under review, seems to regard the east-and-west trend of the bird-flights as Herr Gätke's principal heresy, to the refutation of which the shattering of the "broad front" is merely subsidiary. It is, however, against the "broad front" and the "undeviating line" that all his heavy array of facts is really marshalled, and the case for at least a considerable east-and-west migration is left, after all, practically unshaken. Mr. Whitlock objects, too (p. 54), to the doctrine that birds follow a more direct course in spring than in autumn, as "quite unsupported by any positive evidence." It certainly seems at variance with Herr Gätke's rigid east-and-west theory. But that some curious differences between spring and autumn routes exist can be proved by one instance—that of the Nightingale—a bird which we in Ireland have special reason to know seldom straggles *accidentally* from its course, and which at Heligoland is a well-known visitor in spring, yet has never been taken in autumn. The converse case, therefore, of a bird of passage common in autumn but scarce in spring, does not need (although it may fall in with) Mr. Whitlock's supposition of wholesale loss of life in the interval.

In his chapter on "Velocity of the Migration Flight" Mr. Whitlock quotes (p. 94) a comical result of one of Herr Gätke's high estimates. The speed of the Hooded Crow, on migration, is set down as 108 miles an hour. Few of us would have fancied it of our familiar "Scald-crow"; but what follows? Scald-crows, as we know, are little incommoded by weather; but it seems the migrating bird, moving 108 miles an hour, objects to have its feathers ruffled by wind "blowing through its plumage obliquely *from behind*." So—says Herr Gätke—when flying westward before a strong south-east wind, it turns its face southward, and in this attitude maintains its westward flight with the same velocity as under normal conditions. Herr Gätke does not, of course, mean his readers to imagine a wind blowing at the terrific pace of 108 miles an hour (*i.e.*, 158 feet a second!); but, as Mr. Whitlock points out, no slower breeze than this would ruffle the rear-feathers of a bird flying at that particular rate; indeed, in flying sideways, the Crow would to some extent be creating the very inconvenience he is represented as seeking to avoid. It is certainly to be regretted that the pretty little Bluethroat, whose speed is set down as 180 miles an hour, travels only by night, and can never be seen in the performance of its wonderful exploit.

PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent donations include a cockatoo from Mr. B. Thompson, two Indian Pythons and a Diamond Snake from Mr. W. Cross, some Trout and water-plants from Mr. F. Godden, two Bramblings, a Chaffinch, and a Bunting from Mr. J. L. T. Dobbin, and an Indian Mynah from Mrs. Denny. A pair of Wolves, a Malayan Bear, twenty-two monkeys, and a number of freshwater-fish have been acquired by purchase.

On March 11th, the Lord Lieutenant opened the newly arranged house for reptiles, and diving-birds, and fish, described in the last number of the *Irish Naturalist*.

One puppy of the last litter born of the Cape Hunting Dog is alive and thriving. This highly interesting specimen—the first of the species ever reared in captivity—is to be given to the collection of the Zoological Society of London.

4,778 persons visited the gardens in February.

DUBLIN MICROSCOPICAL CLUB.

FEBRUARY 15.—The Club met at the house of Mr. A. ANDREWS.

Mr. GREENWOOD PIM showed a slide of dust collected in Melbourne, on 27th December, 1896, after a (so-called) rain of blood. The particles were very minute and mostly rounded; organic remains extremely scarce. Prof. Cole, to whom the material was submitted, was of opinion that it was desert sand, similar to that resulting from "red rains," which have occurred in Greece and Italy, and which were derived from the Sahara; the rounded grains and reddish tint confirming this view.

Mr. Pim also showed a specimen of *Nectria coccinea* in situ on bark, the brilliant red conceptacles nestling among the bright green *Protococcus* forming an exceedingly pretty object for a low power and condensed illumination.

Mr. F. W. MOORE exhibited a brightly-coloured species of fungus which had attacked the pseudo-bulbs of *Odontoglossum pulchellum*. The species has been determined by Mr. G. Massee as *Calonectria luteola*, Sacc.

Mr. M'ARDLE exhibited specimens of *Lachnella echinulata*, Awd., a rare discomycetous fungus, which has minute waxy white cups, globose in the young state, afterwards the disk becomes flattened and shortly stipitate, externally villous. Each hair at the apex bears a globose echinulate head, forming a radiating margin, and is a beautiful microscopic object. The specimens were found in Glenealy Wood, Co. Wicklow, growing on the decayed leaves of the oak, in August last year, by Dr. McWeeney and Mr. M'Arkle, when collecting for the Flora and Fauna Committee of the Royal Irish Academy.

BELFAST NATURALISTS' FIELD CLUB.

MARCH 17.—The President (Mr. LAVENS M. EWART) opened the proceedings by calling upon the geological secretary's report of the season's work. The report was read by Miss THOMPSON, and stated that the Club's work had been interfered with by wet and inclement weather, which prevented the excursion to Pomeroy from taking place, and rendered abortive another to Lough Neagh. Miss Thompson then referred to the help given by members to Dr. Hume during his visit to the North of Ireland to investigate the Chalk, and also expressed the hope that if Professor Tate should revisit Belfast some opportunity would be given for members to meet the Club's founder. One of the interesting finds of the year was a junction of chalk and basalt, discovered by Mr. R. Bell on Squire's Hill. Sections of it show that, in many cases, the tiny shells of the Foramanifera found in it are still unaltered. It has now proved a most desirable arrangement to have the Club's work done systematically by organised sections, and it is worth mentioning again that any member can join any section by sending his name in to the secretary of the section, thereby securing notices of all sectional meetings and excursions which cannot be generally noticed. Allusion was then made to Mr. Robert Bell's find of plant-remains below the boulder clay, and to the continued work on the erratic blocks. "Ailsa" rock has now been found by Mr. Welch at Portrush. The work done hitherto has been on the lines now worked by the International Boulder Committee of the British Association. An excursion was held to Dromore during the Christmas holidays to investigate an apparent distinction into upper and lower clays. This, however, must remain doubtful.

The next paper was read by the Vice-President (the Rev. C. H. Waddell, B.D.) on the "Geological History of Plants." A short discussion followed this paper.

Mr. RICHARD HANNA then read a paper on "Alien Plants," or plants which have been artificially introduced, which will appear in these pages.

Some lantern slides by Messrs. Welch, Fennell, Gray, Phillips, and other members were next displayed by Messrs. Lizars. They included slides of a series of dykes, glacial beds, glaciers, rock-specimens, and features of local geology.

A number of exhibits of geological and botanical subjects were arranged in the lower room. There was also on view the new slicing machine for cutting rock-sections, recently presented to the Club by Messrs. Combe, Barbour, and Combe, and made to the design of Mr. H. J. Seymour by them. Mr. Seymour explained its action to a large number of members. The following is a list of some of the more important exhibits:—Series of fossils from Chalk, Greensand, and Lias of Ireland and parts of England, by Mr. R. Bell; plant remains from Ballypallady, and from museum; varieties of silica, by Mr. H. J. Seymour; living Cycads and igneous rocks, by Mr. A. G. Wilson; fossils from Carboniferous and Lias, by Mr. Wm. Gray; erratics from Club collection; mycelium of fungus in wood and *Rubus Drejeri* var. *hibernicus*, by the Rev. C. H. Waddell; fossil wood from West Indies and Lough Neagh. There were a number of other exhibits. Two new members were elected, and the meeting concluded.

BOTANICAL SECTION. 27TH FEBRUARY.—The whole time was taken up with the study of the extensive order Leguminose. Rev. C. H. Waddell drew attention among other features to the tubers formed on the roots by which some of these plants obtain supplies of nitrogen, and showed some on the roots of the bean.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

MARCH 2.—The following papers were read:—"Ireland: Its ancient Civilisation and Social Customs," by Mr. SEATON F. MILLIGAN, M.R.I.A., and "Boulder Clay—a marine deposit, with special reference to the 'Till' of Scotland," by Mr. JOSEPH WRIGHT, F.G.S. Professor Everett occupied the chair.

Mr. Wright, after describing the chief characteristics of boulder clay, said that geologists all agreed that this clay, which formed the greater part of the subsoil of the British Isles, was the result of ice action, and that it was deposited at a time when an Arctic climate prevailed somewhat similar to that at present existing in Spitzbergen. But geologists were not so unanimous in their theories explaining its formation, some holding that it was the result of the action of land ice, and others that it was of marine origin. Special attention had been given to this subject by geologists in the North of Ireland. Major-General Portlock's opinion was that these clays were of marine origin, and in his report on the geology of Londonderry, published in 1843, he gave a list of fossil shells found by Messrs. Bryce and Hyndman in boulder clay which was cut through when the reservoir for the Belfast Waterworks was being excavated. Mr. S. A. Stewart, the curator of the Museum, published in 1880 a list of mollusca from Irish boulder clay, in which he recorded sixty-nine species of shells. Examples of *Leda pernula* and *Leda pygmaea* were obtained both at Woodburn and the Knock with their valves in juxtaposition, which proved that they must have lived on the spot where found. Mr. Wright then proceeded to describe his examination of boulder clay from the vicinity of Glasgow, and expressed his indebtedness to Mr. James Neilson, vice-president of the Glasgow Geological Society, or his kindness in supplying him with samples of typical Scottish boulder clay. Material from eleven different localities had been examined, and in all of these Foraminifera were found. These specimens were all of the same species as those found at present in shallow water off the Irish coast, and, with the exception of *Discorbina parisiensis*, had all been found in Irish boulder clay. *Rotalia Beccarii*, *Nonionina depressula*, and *Polystomella striatopunctata* were the most abundant in the clay, and the same species were the most common amongst our shallow-water forms. Mr. Wright concluded by saying that the result of his examination of both the Scotch and Irish boulder clays, and the finding in them of many shallow-water organisms, forced him to the conclusion that the boulder clay both in Scotland and Ireland was of marine origin.

MARCH 17.—A Special Meeting was held, when the following Paper was read by JOHN FINNEGAN, B.A., B.Sc., "The History and Properties of Rontgen Rays," fully illustrated with special experiments and lantern photo-slides.

DUBLIN NATURALISTS' FIELD CLUB.

The fourth business meeting of the Club for the session 1896-7 was held on Tuesday evening, February 9th, 1897, in the Royal Irish Academy House, the President, PROFESSOR COLE, F.G.S., in the chair. There were 115 members and visitors present. The minutes of the last meeting were read and signed. Mr. R. L. PRAEGER, B.A., B.E., Vice-President, then read a paper entitled "Bog-bursts, with special reference to the Kerry Disaster," which will shortly appear in our pages.

The Secretary (Dr. T. JOHNSON) showed lantern and microscopic preparations illustrating the relation of the structure of the bog moss (*Sphagnum*) to its water-absorbing powers, and pointed out how little was known economically of Irish bogs. Mr. M'ARDLE demonstrated the cryptogams and Mr. Praeger the flowering plants collected. Mr. M'Ardle also gave an account of the various Irish species of *Sphagnum* and their habitats. Mr. A. V. JENNINGS suggested, by comparison with the causes of avalanches of Switzerland, the weed and rock slides of New Zealand, that special agencies, such as faults and underground springs, were not necessary to account for bog-bursts generally. Mr. RAMAGE, F.I.C., spoke on the chemistry of bogs, explaining the cause of their antiseptic properties. Prof. COLE spoke highly, as an eye-witness, of the work of Mr. Praeger and the other members of the Royal Dublin Society Committee, and suggested the Field Club itself might try to do something in the investigation of Irish bogs, failing the more appropriate action of the Government.

The Secretary next exhibited specimens of a drift seed (*Mucuna urens*) picked up on the shore at Kilkee (Co. Clare), and sent to him for identification; also specimens of so-called Jumping-Beans recently presented to the Science and Art Museum. Mr. J. G. Robertson exhibited specimens of fossil fish from the Kilkenny coalfields. The following nominations for membership were read:—Mrs. W. Deaker, Dr. J. Trumbull, W. H. MacMahon Phelan, and Misses Bernard, Cragg, Longford, and Wann.

It was agreed that the Club should become a member of the Mycological Society.

CORK NATURALISTS' FIELD CLUB.

FEBRUARY 24.—Mr. R. LLOYD PRAEGER lectured on "Bogs and Bog-bursts, with special reference to the recent disaster in Kerry." The President, Mr. W. H. Shaw, occupied the chair.

LIMERICK AND CLARE FIELD CLUB.

FEBRUARY 23.—Mr. R. LLOYD PRAEGER lectured on "Bogs and Bog-bursts, with special reference to the recent disaster in Kerry." Dr. Fogarty occupied the chair, and a discussion followed the lecture.

MARCH 16.—Mr. E. TAYLOR lectured on "Celtic Ecclesiastical Art."

FIELD CLUB NEWS.

The Belfast Club have again arranged with Prof. Cole for a course of instruction in practical geology. A course of six three-hour lessons in the examination of rocks will be accompanied by three excursions, and preceded by a public lecture entitled "The Building of Ireland: the Landscape and the Ground beneath it."

On March 2nd and 9th Mr. R. A. Phillips delivered two lectures under the auspices of the Cork Club, the first "On Collecting, Preserving, and Identifying Plants," the second on "Rare and Characteristic Plants of County Cork." Practical lectures of this kind are much to be commended.

The recent addition of archæology to the field of work of the Limerick Club has resulted in a surprising influx of new members. In three months the membership has doubled itself, and now stands at close on 200. At the commencement of last year it stood at 60. The title of the Society has been slightly altered to suit its wider field: it is now styled "The Limerick and Clare Field Club."

The following excursions of the Dublin Club are announced:—April, Sugarloaf Mountain; May, Powerscourt and Douce Mountain; June, Edenderry; July, Ballycastle, Co. Antrim (three day excursion in conjunction with Belfast Club); August, Kerry bog-slide; September, Avondale, Vale of Ovoca. The exact dates will be announced later.

N O T E S.

The Introduction of Alien Species.

Allow me to enter a strong protest against some of the editorial remarks on "Ignorance and Introduction" in last month's number of the *Irish Naturalist* (p. 82). I sincerely hope that no one will be thereby deterred from the attempt to naturalise beautiful or useful plants or animals in Ireland. The Editors do not, I suppose, disapprove of the introduction of foreign timber into our forests, or the fixing of shifting sands by planting grasses which may not be indigenous to the locality. Do they object to beautifying our bogs and marshes by planting foreign heaths which may scatter their seeds and multiply? Is it a whit more objectionable to increase our very limited stock of a lovely butterfly like *Gonepteryx rhamni*, or *Vanessa io*? If their strictures go so far I may be permitted to express the hope that the love of beauty and utility will prevail over the making of catalogues.

GEORGE V. HART.

We thank Dr. Hart for his courteous note and the opportunity which it affords us of stating our position on the subject more definitely. Our remarks were particularly directed against the introduction of common British species, absent from Ireland or whose range here is restricted to

certain localities. Geographical and geological problems of the greatest interest lie behind work on the distribution of plants and animals, and every student of the subject knows that the Irish flora and fauna furnish specially suggestive facts for the solution of these problems. We hold, therefore, that deliberate falsification of the geographical record is a grave scientific offence, since it tends to make the facts on which we have to build insecure.

There are, of course, some introductions which cannot mislead anyone; we have nothing to say against these. No one would suppose that Lord Powerscourt's Japanese Deer are indigenous Irish mammals; while in many cases botanists can determine with certainty that a tree or shrub has been planted. But so many species, unknown in Great Britain, have been and are being found in Ireland, that the greatest possible care should be taken not to introduce anything at all likely to deceive naturalists. Dr. Hart mentions foreign heaths. When we consider the intense interest of the Mediterranean heaths which are so striking a feature in the flora of western Ireland, we would specially beg that our plants of this family may not be tampered with for the sake of "beauty and utility." Let foreign heaths be grown in greenhouses and gardens, and our moors and marshes left to the undisturbed possession of the native plants. A few months ago we recorded the occurrence of a North American plant, *Sisyrinchium californicum*, in Co. Wexford. Though it grows over several acres, botanists cannot be certain that we should be justified in adding it to our list of four or five undoubtedly indigenous North American plants. In view of the special affinities of a section of the Irish flora and fauna, the introduction of North American or Mediterranean species is particularly reprehensible.

The discussion about the Frog in Ireland which is still going on in our pages, illustrates the difficulties raised for the student of distribution by the introduction of a species. The paucity of Irish reptiles and amphibians has been noted from time immemorial, and is a striking evidence that Ireland is an older island than Great Britain. Yet, because of the recorded introduction of the Frog two centuries ago, we shall always be in some doubt whether our most abundant representative of these two classes is native or not. And when the details of the subject come to be worked out, doubt on such a point vastly increases the difficulty—already great enough—in coming to right conclusions.

Dr. Hart hopes "that the love of beauty and utility will prevail over the making of catalogues." The making of catalogues is necessary, but it is not the end of the study of distribution. The catalogue is required as a starting point—a record of facts from which further studies can be undertaken: studies into the 'past history of the living creation around us and of the land which it adorns. The artificial pursuit of "beauty and utility" by the landscape-gardener and the breeder is, we believe, possible without hindrance to the pursuit of truth by the naturalist

BOTANY.

PHANEROGAMS.

Broom (*Sarothamnus scoparius*) flowering in Winter.

At the end of December and beginning of January I saw two shrubs of Broom in flower, at Ballyhyland, Co. Wexford. The flowers, to be sure, were few, but they were fresh. The Broom occasionally—though not, I think, often—bears a few sprays of autumnal blossom in October. I noticed this in 1882, and again in 1886. But I have never before observed it flowering at the close of the year.

C. B. MOFFAT.

ZOOLOGY.

AMPHIBIANS.

The Frog in Ireland.

I am glad to see Mr. Barrington's note on the vocal powers of the Frog, which Dr. Scharff so slightly estimates. I would add, that one need not always wait for "sunny mornings of March" to have ample proof of the Frog's ability to make himself heard, for this year it was on the 11th of January that my ears were first greeted by the "music of the marsh," proclaiming that *Rana temporaria* considered it spring-time. Last year, the corresponding date in the same locality (in Co. Wexford) was January 17th. On warm evenings the frogs around Dublin sometimes make the air resonant quite late into the dusk. On March 17th, 1892, I have a note of their loud and incessant croaking in ditches along the Royal Canal at 9 p.m. (This may have been a special Patrick's Day Demonstration in mockery of the arch-exterminator, whom Dr. Guithers, F.T.C.D., has reduced to his proper level: for I have not heard anything quite equalling it since.) Had Saint Donatus been present he would certainly have seen reason to revise his poetry.

C. B. MOFFAT.

In response to my friend Mr. Barrington's invitation to hear the frogs croak, I went out to Fassaroe on the 7th March. They had, however, already become silent, after their very short courtship which lasted for about a week. Although I had not the pleasure of hearing them, I have no hesitation in accepting Mr. Barrington's statement that Irish frogs croak rather louder than I believed, especially when there are a large number together. But even then the noise, from the description given to me, cannot be compared with that made by the Edible Frog, which moreover croaks almost throughout the whole spring and summer.

R. F. SCHARFF.

THE ICTERINE WARBLER.

HYPOLAIIS ICTERINA. GARTEN LAUBVOGEL. SPOTT VOGEL.

BY THE REV. CHARLES W. BENSON, LL.D.

ON 26th July, 1882, I had the pleasure of hearing this remarkable songster in the Bosch, as the Park at the Hague is called. Strolling in with my boy in the hope of finding some birds new to us, we were gratified in a few moments by hearing from a tree near a marshy piece of ground a song we had never heard before.

The singer began somewhat like a Thrush, and I thought that perhaps he might be a Redwing; then there were a few jarring notes, and then he broke out into one of the most delightful and varied songs imaginable. We listened with all our ears, until we were obliged to leave for the train to Rotterdam.

On my return to Dublin, still unacquainted with the performer's name, I found in the Library of Trinity College, in Dresser's great work, the following description of the Icterine Warbler's song quoted from Professor Collett's "Bird-life":—"Its song not a little resembles that of the Nightingale, but one may find again the ditty of the Song Thrush; it is the very best of our songsters." On reading these words I felt certain that our unknown friend was the Icterine Warbler.

I did not hear this remarkable bird again until July, 1891, when English chaplain at Kissingen in Bavaria. Then we found him near the little river Saale in a tree close to the Iron Bridge, from which day after day he uttered wonderfully loud and melodious notes, interspersed with harsh cries and discords, some of these were so loud and strange, that I was surprised that Germans passing over to take their "moorbad" did not pause in wonder. One note was especially like that of a Parrot.

Shortly after, my wife found the nest in the fork of a low tree just behind the Kurhans, and we frequently visited it, whilst the female never stirred or seemed alarmed as we looked

down upon her. Once again at Karlsbad, in 1893, we heard, but very rarely, the same curious and very striking notes, but neither at Kissingen nor at Karlsbad did we hear anything like the lovely song that gladdened our ears at the Hague.

Now it is very remarkable that Mr. O. V. Aplin, in his interesting paper on the song of this 'bird in Africa,'¹ states that he never heard there this sweet and wonderful song; he re-echoes Mr. Seeböhm's description, "it screamed, it warbled and chuckled voluminously," and this well represents what I heard at Kissingen and Karlsbad, but falls very far short of my experience in Holland.

On the other hand, my friend, the late Mr. J. G. Rathborne, who shot the only specimen of this bird obtained in Ireland, assured me that he was attracted by its splendid song, which was quite new to him, and that he watched it in his grounds at Dunsinea, near the Observatory at Dunsink, as it rose up from the willow trees, after the manner of fly-catchers, and returned singing to the branch again.

On 29th May, 1886, as mentioned in the *Zoologist* for that year, Mr. (now the Rev.) Allan Ellison, an excellent observer, believed that he saw and heard this bird in the famous woods of Coolattin, Shillelagh, Co. Wicklow. He says:—

"Its song began with a few rather harsh strains, but in general it was quite delightful, far surpassing in charm and melody any song I have ever heard. But for its song I could have hardly distinguished it from our Willow Warbler, but it was of a more decided yellow colour, and had a longer tail. After watching the bird for about half an hour I passed on, but on returning to the same spot an hour afterwards I could see or hear nothing of it, nor have I ever met it since."

On hearing from Mr. Ellison, I hurried down to Shillelagh, but found that, alas! the bird had flown.

In the same month of May, Mr. Murray A. Matthew, Stone Hall, Pembrokeshire, heard this bird apparently, in South Wales. He writes to the *Zoologist* as follows:—

"Early in May I heard the notes of a bird that were quite new to me in our shrubberies; since then he has taken up his station in an ash tree just outside our grounds, and sings a most delicious song all day to the delight of passers-by, who return again and again to listen to his melody. The notes are very sweet and liquid, imitating some of the trills of the Song Thrush. Seen high up through the foliage he looks like a Chiff-Chaff, but when he descends he seems darker about the wings, his breast

seems of a pale yellow. The other side of his hedge is a swampy cover of furze, willow, rushes, and young spruces, where I have searched unsuccessfully for the nest, which no doubt is there. In my opinion our little warbler is no other than the Icterine Warbler."

It will thus be seen that some observers think that Mr. Seebohm, doubtless a host in himself, has rather underrated and that Mr. Aplin has not heard this remarkable bird at its best. It is to be hoped that he may have opportunities of hearing it again this year, and I shall look out with much interest for any remarks from him. In a letter I received last month from Mr. H. N. Pashley, Naturalist, of Cley-next-the-Sea, Norfolk, he says that an Icterine Warbler was taken there on 8th September, 1896, by Mr. R. Gurney, of Sproston Hall. Another had been taken in 1894 near Cley by a London gentleman. May we not hope for further tidings of this remarkable bird in 1897?

An interesting account, and an excellent coloured plate of the Icterine Warbler may be found in "A Chapter on Birds, Rare British Visitors," by Dr. Bowdler Sharpe, of the Zoological Department, British Museum. I cannot help feeling sorry, however, that he has called the bird the "Common Tree Warbler," instead of perpetuating its good old name of the Icterine Warbler derived from the Latin and Greek "Icterus," meaning: (1) "The Yellow Jaundice," (2) "A Yellow Bird, which if one see, being sick of the yellow jaundice, the person recovers, but the bird dieth." Can there be a stronger testimony to its vocal powers, and their disinterested exercise than this?

I trust that some of my readers may be successful in hearing this sweet songster in Ireland this year, for to me it will always be the sweetest of birds, and should they do so, will at once apprise me of the fact, that I may hasten gladly to the favoured spot.

A DAY'S DREDGING OFF BALLYCASTLE, CO. ANTRIM.

BY GEORGE W. CHASTER.

HAVING been strongly urged by Mr. R. Welch, of Belfast, to study the molluscan fauna of the North Antrim coast, last September, Messrs. J. R. Hardy and R. Standen, of Manchester, and myself arranged to "prospect" that region, which is to English conchologists almost a *terra incognita*.

Crossing from Liverpool by one of the Belfast S.S. Co.'s well-appointed boats, we reached Belfast in good time in the morning, and were soon *en route* for our destination—Ballycastle. Here we were met by Mr. Welch, who had made all arrangements for our convenience by securing rooms at the comfortable "Antrim Arms" Hotel, and by providing a roughly-outlined programme to guide our operations. To his hearty assistance may be assigned a large measure of the success attending our trip to a region which we were afterwards unanimous in declaring so full of charm and interest as to demand revisiting and investigating further.

The results of our collecting among the land and fresh-water mollusca have already appeared in these pages (*I.N.*, vol. vi., pp. 1-9, Jan., 1897).

One day was spent in dredging, and the object of this paper is to record the results of the day's work. I may here parenthetically remark that the study of marine conchology at Ballycastle presents some difficulty. The small tidal rise and fall renders shore-work unproductive of any save the very commonest forms; the swift and powerful tidal currents keep up a constant to-and-fro wash along the sea-bed in the lines of their action, and this constantly-washed bottom is, of course, inimical to molluscan life. However, we carefully discussed the matter beforehand, aided by a small-scale chart and the advice of an experienced local boatman—Coyles—and at last decided upon certain likely spots. Starting out, we ran across to Rathlin Island, and tried two hauls to the east of the island. The first brought up only a few Echinodermata and Hydrozoa evidently scraped off bare rock. Further out we brought up from 45 fathoms a heavy dredgeful of gravel and shells, so

very "dead" that a change of scene was decided upon for our next attempt. Rounding Rue Point of the island we had two hauls from good "live" ground in 15 and 17 fathoms of water. Wishing to try the sandy bottom of Church Bay we went thither and brought up from 8 and 11 fathoms a quantity so large that, after passing it through our sieves, all the finer portion except two bags-full was reluctantly thrown back. Our boatman now warned us that we must quickly return to the mainland if we were to avoid the dreaded tide-race. On reaching Ballycastle Bay we tried the bottom in $26\frac{1}{2}$ fathoms, but, finding it to consist of clean-washed, fine gravel and dead shells, a sample only was retained. After another unsuccessful haul we landed, agreeing that we had by that time acquired a sufficiency of shells and dredged material to search through at home, as well as of dampness, weariness, and hunger.

The dredgings were, perhaps, not such as would attract the attention of the uninitiated. An array of bags filled with fine material, two or three small boxes containing dead shells and a few, mostly inconspicuous, living forms were all we had to show. As, however, amongst the latter were *Propilidium ancyloides*, Forbes, and, as the ground was evidently good, confident hopes were held as to the ultimate results. The marine mollusca being given into my charge, I brought home the half hundredweight of finer material and examined it with a constantly increasing interest as its richness became manifest. Our single day's dredging has resulted in the addition to the British fauna of three species, *Leda pusilla*, Jeff., *Homalogryra polyzona*, Brus., and *Adeorbis unisulcatus*, Chaster, the last being new to science. Of course all are of minute size, our shallow waters having been too carefully searched for us to expect novelties except of diminutive dimensions. I would here urge the importance of the study of the marine mollusca. Conchologists sometimes confine their attentions to the land and freshwater species, and neglect the forms inhabiting the sea, though the latter offer an incomparably richer field for investigation, whether from a malacological or conchological point of view. The relative importance of the one to the other may be roughly inferred from the fact, that Woodward in the systematic part of his "Manual" devotes about ten times as

much space to the marine as to the terrestrial and fluviatile groups. In the subjoined list most of the species are merely mentioned by name, a few remarks being appended on those which are of special interest. Species of which we obtained living specimens are indicated by the italicised and bracketed letter 1 (*l.*). Such as are not included in Mr. R. Ll. Praeger's list of North Irish mollusca (Appendix to Ann. Rep. and Proc. Belfast Nat. Field Club, 1887-88) have a prefixed asterisk. I may here say parenthetically that on the shore of Whitepark Bay we obtained a large piece of drift-wood, completely riddled by *Teredo megotara*, Hanley, another addition to Mr. Praeger's list. The arrangement and nomenclature of Jeffrey's "British Conchology" are employed for convenience sake, not because I agree with them.

For other remarks on the *rariora* I would refer the reader to the notes at the end of my paper.

<i>Anomia ephippium</i> , L.	<i>M. bidentata</i> , Mont.
<i>A. patelliformis</i> , L. (<i>l.</i>)	<i>M. ferruginosa</i> , Mont.
<i>Ostrea edulis</i> , L.	* <i>M. donacina</i> , Jeff.
<i>Pecten pusio</i> , L.	<i>Lasaea rubra</i> , Mont.
<i>P. varius</i> , L. (<i>l.</i>)	<i>Kellia suborbicularis</i> , Mont.
<i>P. opercularis</i> , L. (<i>l.</i>)	<i>Lucina borealis</i> , L.
<i>P. tigrinus</i> , Müll. (<i>l.</i>)	<i>Axinus flexuosus</i> , Mont.
<i>P. Testæ</i> , Biv. (<i>l.</i>)	<i>Cyamium minutum</i> , Fabr.
<i>P. maximus</i> , L. (<i>l.</i>)	<i>Cardium echinatum</i> , L.
<i>Lima elliptica</i> , Jeff.	<i>C. fasciatum</i> , Mont. (<i>l.</i>)
<i>L. Loscombi</i> , G. B. Sow.	<i>C. minimum</i> , Phil.
<i>Mytilus modiolus</i> , L. (<i>l.</i>)	<i>Cyprina islandica</i> , L. (<i>l.</i>)
<i>M. phaseolinus</i> , Ph. (<i>l.</i>)	<i>Astarte sulcata</i> , Da Cos. (<i>l.</i>)
<i>Modiolaria marmorata</i> , Forb. (<i>l.</i>)	<i>A. triangularis</i> , Mont.
<i>M. discors</i> , L. (<i>l.</i>)	<i>Circe minima</i> , Mont. (<i>l.</i>)
<i>Crenella decussata</i> , Mont.	<i>Venus exoleta</i> , L.
<i>Nucula nucleus</i> , L. (<i>l.</i>)	<i>V. lincta</i> , Pult.
<i>N. nitida</i> , G. B. Sow.	<i>V. casina</i> , L.
<i>N. tenuis</i> , Mont.	<i>V. ovata</i> , Penn.
<i>Leda pygmæa</i> , Münst.	<i>V. gallina</i> , L. (<i>l.</i>)
<i>L. minuta</i> , Müll. (<i>l.</i>)	<i>Tapes virginicus</i> , L.
* <i>L. pusilla</i> , Jeff.	<i>Lucinopsis undata</i> , Penn (<i>l.</i>)
<i>Pectunculus glycimeris</i> , L.	<i>Tellina squalida</i> , Pult.
<i>Arca tetragona</i> , Poli (<i>l.</i>)	<i>T. pusilla</i> , Phil.
* <i>Galeomma Turtoni</i> (Eds. Z. J.)	<i>T. fabula</i> , Gron.
<i>Lepton nitidum</i> , Turt.	<i>T. crassa</i> , Penn.
<i>L. Clarkiae</i> , Cl.	<i>Psammobia ferrœensis</i> , Chem. (<i>l.</i>)
<i>Montacuta substriata</i> , Mont.	<i>Mactra solida</i> , L. v. <i>elliptica</i> , Br. (<i>l.</i>)

M. subtruncata, Da Cos. (*L.*)
Scrobicularia prismatica, Mont. (*L.*)
S. nitida, Müll. (*L.*)
S. alba, Wood (*L.*)
Solen ensis, L. (*L.*)
Pandora inaequivalvis, L.
Thracia papyracea, Poli.
T. prætenuis, Pult.
Corbula gibba, Ol. (*L.*)
Mya Binghami, Turt. (*L.*)
Saxicava rugosa, L. (*L.*)
Dentalium entalis, L. (*L.*)
Chiton fascicularis, L.
C. cinereus, L. (*L.*)
C. ruber, Lowe (*L.*)
Helcion pellucidum, L.
Tectura testudinalis, Müll.
T. virginea, Müll. (*L.*)
T. fulva, Müll.
Propilidium aencyloides, Forb. (*L.*)
Puncturella noachina, L.
Emarginula fissura, L. (*L.*)
Fissurella græca, L.
Scissurella crispata, Flem.
Capulus hungaricus, L.
Cyclostrema nitens, Phil. (*L.*)
C. serpuloides, Mont. (*L.*)
Trochus helicinus, Fabr.
T. tumidus, Mont. (*L.*)
T. cinerarius, L. (*L.*)
T. Montacuti, W. Wood.
T. millegranus, Ph. (*L.*)
T. zizyphinus, L. (*L.*)
Phasianella pullus, L. (*L.*)
Lacuna crassior, Mont. (*L.*)
L. divaricata, Fabr. (*L.*)
 var. *quadrifasciata*, Mont.
L. puteolus, Turt.
L. pallidula, Da Cos.
Rissoa cancellata, Da Cos.
R. reticulata, Mont.
R. calathus, F. & H.
R. cimicoides, Forbes.
R. punctura, Mont. (*L.*)
R. zetlandica, Mont.
R. costata, Ad.
R. parva, Da Cos. (*L.*)
 var. *interrupta*, Ad. (*L.*)

R. inconspicua, Ald. (*L.*)
R. proxima, Ald.
R. striata, Ad. (*L.*)
R. soluta, Pli. (*L.*)
R. semistriata, Mont.
Skenea planorbis, Fabr.
Homalogyra atomus, Ph. (*L.*)
**H. polyzona* (Brus. mss.), B. D. & D. (*L.*)
H. rota, F. & H. (*L.*)
Cæcum glabrum, Mont. (*L.*)
Turritella terebra, L.
Scalaria communis, Lmk.
S. trevelyanæ, Leach.
S. clathratula, Ad.
Aclis unica, Mont.
A. ascaris, Turt.
A. supranitida, S. Wood.
A. Gulsonæ, Cl. (*L.*)
**Odostomia minima*, Jeff.
O. nivosa, Mont.
O. truncatula, Jeff.
**O. clavula*, Lov.
O. rissooides, Han.
O. pallida, Mont.
**O. conoidea*, Broc. (*L.*)
O. acuta, Jeff.
O. turrita, Han. (*L.*)
O. unidentata, Mont. (*L.*)
O. insculpta, Mont. (*L.*)
O. Warreni, Thomp.
O. interstincta, Mont.
O. indistincta, Mont.
O. spiralis, Mont.
O. scalaris, Ph.
O. rufa, Ph. (*L.*)
O. Scillæ, Sc.
O. acicula, Ph.
O. nitidissima, Mont.
O. lactea, L.
**Eulima intermedia*, Cant. (*L.*)
E. distorta, Desh. (*L.*)
E. bilineata, Ald.
Natica Alderi, Forbes (*L.*)
N. Montacuti, Forbes.
**Adeorbis imperspicuus*, Monts^o.
**A. unisulcatus*, Chaster.
Lamellaria perspicua, Mont. (*L.*)

<i>Velutina laevigata</i> , Penn. (<i>L.</i>)	<i>D. purpurea</i> , Mont.
<i>Aporrhaia pes-pelicanii</i> , L.	<i>Pleurotoma costata</i> , Don.
<i>Trichotropis borealis</i> , B. & S.	<i>P. nebula</i> , Mont.
<i>Cerithium reticulatum</i> , Da Cos.	<i>P. rufa</i> , Mont. (<i>L.</i>)
<i>C. perversum</i> , L.	<i>P. turricula</i> , Mont. (<i>L.</i>)
<i>Cerithiopsis tubercularis</i> , Mont.	<i>Marginella laevis</i> , Don.
<i>Buccinum undatum</i> , L. (<i>L.</i>)	<i>Cypraea europaea</i> , L. (<i>L.</i>)
<i>Trophon truncatus</i> , Str. (<i>L.</i>)	<i>Cylinchia cylindracea</i> , Penn. (<i>L.</i>)
* var. <i>alba</i> , Jeff. (<i>L.</i>)	* <i>C. nitidula</i> , Lov.
<i>T. barvicensis</i> , Johnst. (<i>L.</i>)	<i>Utriculus mammillatus</i> , Ph.
<i>T. muricatus</i> , Mont. (<i>L.</i>)	<i>U. truncatus</i> , Brug. (<i>L.</i>)
<i>Fusus antiquus</i> , L.	<i>Bulla utriculus</i> , Broc.
<i>F. gracilis</i> , Da Cos.	<i>Philine angulata</i> , Jeff.
<i>Nassa incrassata</i> , Str. (<i>L.</i>)	<i>P. scabra</i> , Müll. (<i>L.</i>)
<i>Defrancia Leufroyi</i> , Mich.	* <i>P. nitida</i> , Jeff. (<i>L.</i>)
<i>D. linearis</i> , Mont. (<i>L.</i>)	<i>Spirialis retroversus</i> , Flem.

Lima elliptica, Jeff.—I do not mark this as an addition to Mr. Praeger's list, because the older writers did not separate it from *L. subauriculata*, Mont.

Leda pusilla, Jeff. (*Proc. Zool. Soc.*, 1879, p. 580, pl. xlvi., fig. 6).—A perfect though dead specimen and two valves, all of small size. The finding of this species in shallow water is of great interest, for though it occurred in the "Porcupine" Expedition dredgings of 1870, S. and S.W. of Ireland, the stations are all in deep water (257 to 690 fathoms) and are outside the southern limit assigned by the Rev. Canon Norman to the British area. It is therefore an addition to our fauna.

Galeomma Turtoni, Eds. (*Zool. Journ.*)—A broken valve was all that was found to represent this species.

This occurrence of this characteristically southern form so far north is remarkable, but it remains to be proved whether it still lives in the district, or is extinct. Professor G. O. Sars in the table appended to his "Bidrag til Kundskaben om Norges Arktiske Fauna" (*Mollusca regionis arcticae Norvegiae*) has included this species amongst those whose record in Norwegian waters rests upon good authority, though its rarity there is attested by the asterisk prefixed to the name, indicating that he has not himself met with it. A not unlikely explanation of its occurrence in these northern localities is that valves have been washed from some of the raised beaches. My late friend, Mr. David Robertson, notes an equally characteristically southern species—*Trochus lineatus*—as moderately common in the raised beach at Cumbrae (*Trans. Geol. Soc. of Glasgow*, 1875, pp. 195, 198). I have no opportunity of ascertaining whether *Galeomma* is known to occur in the raised beach at Portrush, or in others.

Montacuta donacina, Jeff.—Two valves from Church Bay. An excessively rare species. It was obtained by the "Porcupine" Expedition of 1869 in Lough Swilly, 3–13 fathoms.

Homalogrya polyzona (Brus. MSS.), Bucq., Dautz., & Dollf. (Moll. Mar. du Rousillon, p. 325, pl. 37, fig. 32). I have hesitatingly admitted this to rank as specifically distinct from *H. atomus*, Ph. Whether a variety or species it is an addition to our British fauna.

Odostomia truncatula, Jeff. One of our specimens, when carefully examined, is seen to contain the operculum and remains of the animal, thereby affording conclusive proof that the species still lives in the district. Like *Galeomma Turtoni*, it is known in the living state from southern localities only, and but for the observation just recorded it might be considered an equally doubtful denizen of the Antrim sea.

Adeorbis Imperspicuus, Monterosato.

Adeorbis unisulcatus, Chaster. These two species have been generally overlooked owing to their microscopic size. The latter I have described and figured in the current number of the *Journal of Conchology*.

A PROPOSED GEOLOGICAL PHOTOGRAPHIC SURVEY OF THE COUNTIES OF DUBLIN AND WICKLOW.

BY PROF. GRENVILLE A. J. COLE, F.G.S.

Now that the excursion-season of the Dublin Naturalists' Field Club is about to open, it seems desirable to organise a photographic survey of the counties that lie nearest to our homes. Very little has been done in the way of recording the features of our wilder landscapes, or indeed of any district remote from Kingstown Pier, or the Esplanade at Bray. Mr. W. W. Watts, as Secretary of the Committee of the British Association in charge of Geological Photographs, has brought the matter home to us in a recent number of the *Geological Magazine*, where he points out the excellent work done in the north of Ireland, and remarks "that such districts as the Wicklow Mountains, the beautiful tract of Limerick, the areas of ancient rocks in Galway and Mayo, and the Carboniferous and Old Red Sandstone rocks of Kerry, are all, literally, awaiting development."

Mr. Welch is steadily setting matters right as regards Galway ; but there is much to be done nearer home. It will be all the better done if we can systematise and divide the work. The robust possessors of whole-plate cameras may select the nobler landscapes and the broad aspects of our mountain-contours ; while more lightly equipped artists may deal with this or that boulder, or with the details of important rock exposures.

A permanent series of prints, enlarged to a uniform size, and printed in platinum, may ultimately be formed ; and it is possible that the Dublin Field Club may be willing to give financial aid towards their production. Lantern-slides may also be prepared, and will form a valuable series for exhibition at the winter meetings. At present, Mr. Dowling has recorded the junction of granite and Ordovician rocks at Killiney ; Mr. Welch, the submerged forest-bed at Bray ; Mr. Preston, of Grantham, has a fine series of the promontory of Portrane ; and others doubtless exist, merely awaiting collection. For my own part, I have taken, in lantern-plate size only, fairly complete series of the Balrothery esker, and of the folded strata at Loughshinny. The latter still deserve the attention of any camera that can get at them.

I now write, through the *Irish Naturalist*, to ask for the help of any persons who would be willing to join in the projected survey. If such will be so good as to communicate with me at the Royal College of Science, Dublin, *before Friday, May 7th*, I can then call a meeting in Dublin for *Monday, May 10th*, at 5 p.m., at which we can form our plans and discuss the division of work for the coming outdoor season.

IRISH ANIMALS IN THE DUBLIN MUSEUM.

BY GEORGE H. CARPENTER, B.S.C.

VISITORS to the Natural History Galleries in the Museum of Science and Art, Dublin, must have noticed, during the last few months, that extensive re-arrangements of the collections were in progress. Some may have wondered why such radical alterations were undertaken, considering, perhaps, that the old system was good enough. Others may have thought that the changes had no reason—unless to furnish innocent occupation for the museum staff. Now that the main features of the new scheme have been carried out, a short statement of the plan and object of the changes—especially as regards the collections of native animals—may be of interest to readers of the *Irish Naturalist*.

The Natural History building, situated to the south of Leinster Lawn, consists of a low-pitched, ground-floor storey, and a lofty upper hall surrounded by two galleries. In the former arrangement of the collections, which had lasted for several years, the south side of the ground-floor room was devoted to a collection illustrating the geographical distribution of animals, while the north side was occupied by collections both Irish and general, of fishes, amphibians, and reptiles. Upstairs, the centre of the floor of the hall was used for the general collection of mammals, while along either side were ranged table cases containing the general collection of invertebrates alternating occasionally with life-history groups of Irish birds; in cases against the north wall was the collection of Irish invertebrates (excepting insects), on the landing outside a collection of British mammals. Ascending to the lower of the two galleries the visitor found it entirely devoted to birds—an Irish and a general series. In the top gallery were displayed a set of British birds' eggs and nests and Irish, general, and economic collections of insects.

The incongruity of some of these arrangements was evident enough to the staff of the museum, but objection to the general upset involved in a radical change of plan, necessarily accompanied by the cessation of systematic work on specimens,

served to maintain a conservative policy for several years. The "noble discontent" which led to the present re-arrangement was due to Dr. P. L. Sclater who, after a visit to the Museum about two years ago, gave the officers the benefit of his free criticism and advice. He urged that the various groups of Irish animals, scattered about the building, should be gathered into the lower room, leaving the upper hall for the general zoological series. And he pointed out the objection to the juxtaposition on the floor of the upper hall of mammals and invertebrates.

The main outlines of the new scheme being settled, the details had to be thought out. The top gallery of the upper room has been allocated to the general invertebrates, and specimens are already in the cases, though the arrangement at present is incomplete. The lower gallery is to be devoted to the tunicates, lancelets, lampreys, fishes, amphibians, reptiles, and birds; the cases from which the Irish birds have been removed will shortly be filled with representatives of the lower vertebrate classes, while the general bird collection will be re-arranged, the series running in ascending instead of descending order. The floor of the upper room is given over entirely to the general collection of mammals, and the arrangement is now nearly complete. The large cases which formerly ran down the centre of the hall have been turned at right angles so as to stand transversely. Extra space and a more satisfactory series have thus been obtained; and the large skeletons and stuffed beasts, which formerly stood in the lower room and were worked into the geographical collection because there was no room for them upstairs, have now been brought up and placed in their proper zoological positions. It is hoped ultimately to show in wall-cases a set of mammalian skulls¹. The cases on the landing, whence the British mammals have been removed, have to be used for storage purposes at present. It is intended to transfer to them the "History of Animals" collection (illustrating the factors of evolution) which for the present remains in the lower room, and also to form an

¹ At present the Irish invertebrates have not all been removed from the wall-cases; it is necessary to keep them temporarily stored there until their new quarters downstairs are ready for their reception.

“index collection” to the whole animal kingdom. It will be seen that the general zoological series in the upper hall, under the new arrangement, runs regularly from the protozoa in the first case of the top gallery to the mammals on the floor.

The lower room has to be divided between the geographical distribution series and the new Irish collection. After much consideration it was decided to partition the room into three equal sections by placing transversely across it two pairs of tall cases, each pair set back to back. The eastern third of the room is for the geographical collection, the middle third for the Irish invertebrates, and the western end for the Irish vertebrates. The collections of Irish invertebrates are yet in process of formation, but the general scheme may be indicated. We will suppose a visitor has entered the Museum from Merrion-square ; after passing through the geographical collection he enters the Irish invertebrate section by the eastern end. Here the southern wall-cases and window-cases will be devoted to the protozoa, sponges, hydroids, sea-anemones, corals, &c. ; the worms, polypoa, and brachiopods are already roughly arranged in the cross-case at the western end of the section. In the wall-cases and window-cases at the northern side will be shown the crustacea and in the eastern cross-case the arachnids, millipedes, and centipedes. Having thus walked around the Irish invertebrate section our visitor turns his attention to the floor-space, which is occupied by fifteen table-cases placed in five transverse rows ; beginning at the east end, the first three rows are for the insects, the next row and a half for the molluscs, and the last half row for the echinoderms. The molluscs and echinoderms are already roughly arranged, and a few boxes of insects have been exhibited. It will be long before this section of the Museum really approaches completion, for so little is known of certain orders of Irish invertebrates. Some of the animals, such as the protozoa and the rotifers, on account of their small size, will have to be represented by coloured drawings, or glass models, as also the sea-anemones and nudibranch molluscs, spirit-specimens of which give but a poor idea of the living animals. It is hoped, however, that each year may be marked by additions and improvements to this collection, as more naturalists are found to turn their attention to imperfectly-known groups, and

collectors at the better-worked orders contribute specimens to fill gaps in the Museum series.

Passing from the western end of the invertebrate section, we enter the section devoted to the Irish vertebrates. The arrangement of these is already in a forward state. The series begins with the eastern window-case on the south side, where the lowest vertebrates—the tunicates and lancelet—are shown. At the end of the adjoining wall-case are the lampreys, and in the succeeding window wall-cases on the south, west, and north sides the fishes are exhibited. Most of the species are represented by coloured plaster-casts, which usually give a much more life-like result in the case of fish than either spirit—or stuffed specimens. Where spirit-specimens have to be shown, however, it is intended to substitute flat-faced cells for cylindrical jars, which always distort the object within. A fair number of fish, mounted in the flat cells and coloured by a new method in imitation of the natural hues of the living creature, are now exhibited, and form interesting and beautiful objects.

The birds are shown in tall table-cases ranged on the floor-space, the attractive life-history groups being inserted in their proper places. At present these table-cases stand lengthwise along the room, but it has been decided that a better light on the specimens would be obtained by turning them transversely, and this change will shortly be made. Maps showing the summer and winter range of each species are in preparation, and should prove instructive. In the wall-cases at the east end of the room the mammals are exhibited. It is necessary to be content with drawings of the different kinds of whales, on account of the great size of the specimens; but the visitor is told by labels that skeletons of certain Irish species are included in the general mammalian collection upstairs. One small side-case is given to the rodents, another to the insectivores and bats, while the large central case is occupied by the ungulates and carnivores.

In the lobby outside the lower room the large life-history group of Herring-gulls has long been a familiar object. Nests and eggs of Irish birds have now been placed in table-cases around this lobby, while photographs of nests in their natural surroundings have been hung on the walls. As this lobby

opens from the western end of the room, the collection of nests and eggs now closely adjoins the stuffed specimens of the birds.

The changes thus briefly described are meant to bring together in compact arrangement a series illustrating the present fauna of Ireland. And it is to be hoped that these collections of our native animals will serve a two-fold purpose—giving the casual visitor, whether native or stranger, some idea of the number and variety of living creatures which inhabit our country, and at the same time helping students of the various groups of Irish animals. It need not be pointed out how these students can re-act on the collections, and by their co-operation render them more worthy of our metropolitan museum.

CONTRIBUTIONS TO IRISH NATURAL HISTORY.

Proceedings of the Royal Irish Academy, 3rd series, vol. iv.,
No. 1 (December, 1896).

In this somewhat bulky number, there are several papers dealing especially with the Natural History of Ireland. Mr. R. Lloyd Praeger issues his "Report upon the Raised Beaches of the North-East of Ireland, with special reference to their Fauna" (pp. 30-54, and Plate I.). He thus completes his examination of the beds that fringe the coast, having given us, five years ago, a memorable series of observations on the "Estuarine Clays" of the same area. It is interesting to note that Mr. Praeger supports, on the whole, Prof. Hull's statement as to the increase of elevation above the sea in the raised beaches as we go northward. The beaches rest upon the marine clay, which probably runs down all the eastern coast; and the spots specially examined are Greenore, Carlingford, Greencastle (opposite Greenore), Killough, Sandeel Bay, Ballyholme Bay, Carnalea, The Kinnegar (Holywood), West Bank (Belfast Lough), Kilroot, and Larne. Records of the fauna, so far as known, are quoted, in most cases from personal observation. Indeed, it is only at Kilroot and Larne that the author has been able to glean much in this matter from previously published memoirs. Some of the deposits commonly known as "raised beaches" are, it is pointed out, in reality raised sea-banks, such as the Kinnegar and the Curran of Larne.

On pp. 45 and 46, there is a valuable table for the comparison of the faunas from successive horizons, viz.: the Glacial beds, the Estuarine Clays, the Raised Beaches, and the present sea. From this it is shown that the Ballyrudder gravels and the boulder-clays, forming the base of the series under consideration, have a northern character, the Ballyrudder deposit being practically Arctic. The fauna of the Estuarine Clay and of the Raised Beaches is, on the other hand, "distinctly southern"; while the existing sea contains a mixture in which northern forms slightly preponderate. As an example of the care with which this portion of the subject is followed out, we may quote the statement that the recent change of fauna has been brought about "by the extinction of southern forms rather than by the immigration of northern ones. . . . Some of the shells which have now forsaken the north-eastern shores, or show a striking diminution in numbers, still flourish in the milder climate of Donegal, which is actually further to the northward; while, on the other side, their line of retreat has been down the east coast towards Dublin."

Among these emigrants at the close of the Estuarine Clay epoch, we may note *Scrobicularia piperata* and *Tapes decussatus*, which are common generally round Ireland, but absent from Lough Swilly to Carlingford Lough; *Gastrana fragilis*, mainly a southern and western form; and *Rissoa albella*, which is very abundant in the estuarine clays, but is now found in Ireland only at Bantry Bay. The Raised Beaches similarly contain shells that are now confined to the south and west.

This important paper concludes with a summary of the local climatic changes of Post-Pliocene times, and with a bibliography of the papers utilised.

On p. 61 of this number of the Proceedings, Mr. Henry H. Dixon writes "On the Osmotic Pressure in the cells of leaves," in continuation of his well-known work on the mode of elevation of the sap; but this paper belongs to general botany, and we can only call attention to it here.

On pp. 74—III., Dr. C. R. Browne describes "The Ethnography of Ballycroy, County Mayo," a district selected for the field-work of the Anthropological Laboratory of Trinity College during 1896. This district is peopled by tribes which left Tirconnell more than two centuries ago, and O'Donovan has recorded that the inhabitants were in his time still spoken of by their neighbours as "the Ulstermen." Dr. Browne refers the immigration to 1640 A.D., and shows that the physical differences separating the folk of Ballycroy from those of the rest of Erris are mainly "noticeable in the casts of features and darker nigrescence than in their physical proportions." He finds no justification whatever for the statement, often repeated, that the immigrants from Ulster, dispossessed by the English, have become reduced in stature and altogether physically degraded by their struggle with the "bad lands" of Mayo (p. 80). The present study will gain in value when a number of similar patient observations have been published, and when Prof. Haddon and

Dr. Browne are prepared to base generalizations upon the long series of enquiries that they have set before themselves. It affords yet another example of their systematic methods of research, by which the Irish peasant is approached, in his past environment, in his present needs, and in his beliefs and aspirations, from a position devoid of prejudice, bias, or misguiding sentiment. May we hope that, in the course of time, ethnographic considerations may be allowed due weight in apportioning public praise or blame, and in reading the bitter book of history? At the present time, however, it must be granted that such papers have an essential vein of humour, due to the novelty of regarding our neighbours as objects of Irish Natural history.

On p. 112, Mr. D. M'Ardle describes "Additions to the Hepaticæ of the Hill of Howth, with a table showing the geographical distribution of all the species known to grow there." The author discovered *Jungermania attenuata* at Howth in 1893, the first record of the plant in Ireland; and he has now added nineteen species to his list previously published. Fourteen of these are new records also for the county. *Cephalozia Francisci* is a second liverwort not yet recorded from any other part of Ireland.

The geographical table is suggestive, to an outsider, of the wide distribution of almost all species of liverworts. As the author points out, Howth compares most closely with Yorkshire; but we may suspect that the gaps in the series from the Pyrenees, Scandinavia, France, and Germany, are due to the fact that Mr. M'Ardle, unlike the historic bird, cannot be in all these places at once, and that Ireland is likely for some time to afford him a field of continual discovery and delight.

GRENVILLE A. J. COLE.

N O T E S.

Our warm congratulations to Prof. Sollas on his appointment to the Chair of Geology at Oxford. But he will be much missed by his many Irish friends, and Irish Geology will be a heavy loser by his departure. Another appointment which arouses similar feelings is that of Dr. A. Francis Dixon, Senior Demonstrator of Anatomy in Trinity College, to the Professorship of Anatomy at the University College, Cardiff.

BOTANY.

PHANEROGAMS.

***Dryas octopetala* in Co. Antrim.**

At the March meeting of the Belfast Field Club, Rev. H. W. Lett exhibited specimens of *Dryas octopetala* gathered last November at Sallagh Braes, remarking that his search for it was undertaken in consequence of the comment which we made on his note on this plant published in the

"Journal of Botany" for August last. We are much pleased that our remarks have had the effect which we desired, of settling the question of the occurrence of the Mountain Avens in Co. Antrim; and we heartily congratulate Mr. Lett on adding this interesting Alpine to the local flora.

The Record of *Callitricha truncata* in Co. Cork.

One of the localities given for this species in Babington's Manual, ed. VII. and VIII. is Glansiskin, Co. Cork, but we do not know of any other record of its occurrence in Ireland. Mr. Scully recently sent us a *Callitricha* from the late Mr. A. G. More's herbarium, collected at Glansiskin, which was supposed to be the plant, but upon examination we found it to be *C. hamulata*. By the kindness of Professor Marshall Ward we have since had the opportunity of examining the specimen in the Cambridge Herbarium, collected by Mr. J. Carroll at Glansiskin, and labelled *C. truncata* by Professor Babington, and this also proved to be *C. hamulata*. There does not therefore appear to be any evidence that *C. truncata* is an Irish plant. It is, however, quite likely that it may yet be found on the South or West, inasmuch as it occurs in the South of England, Guernsey, and the West of France.

H. & J. GROVES.

ZOOLOGY.

INSECTS.

Supposed Occurrence of American Beetles in Ireland.

I have sent a note to the *Entomologists' Monthly Magazine* to record the fact that in an Ash-tree which was being cut up in the yard of Messrs. Bass and Co., Burton-on-Trent, were numerous larvae and a few perfect specimens of two North American longicorns, viz., *Neoclytus caprea*, Say., and *N. erythrocephalus*, Fab. As this tree was stated to have been felled at Carrick-on-Suir, it might be worth the while of any one collecting in that district to search for other specimens.

PHILIP B. MASON.

AMPHIBIANS.

The Frog in Ireland.

As an argument for the comparatively recent introduction of the Frog, I can state that the natives of Cape Clear say it is unknown there, and in four or five excursions to that island in various years I have failed to find a trace of it in any stage, though there are very suitable localities for it to breed in. I wonder if it is absent from our other islands, all of which have, I suppose, been detached from Ireland more recently than Ireland from Great Britain.

JOHN J. WOLFE.

BIRDS.

Spring Migrants in Co. Cork.

Sand Martins were flying about on April 2nd—this is just one day earlier than I have *ever* seen them before. I have not yet seen Swallows, but a friend, on whose correctness I rely, told me he saw two flying about his garden every day from March 22nd to 26th inclusive, he has not seen them since. I have never seen them in March, and it seems strange that this remarkably wild wet March should bring them and the Martins earlier than usual.

JOHN J. WOLFE.

Iceland Gull (*Larus leucopterus*) at Londonderry.

On 24th February I saw an immature specimen of this species flying about with other gulls at Derry Quay. In the distance it looked like a very light coloured young Herring Gull, but when it came within twenty yards or so, the entire dull, creamy, white plumage and the white tail without bar at end, showed to what species it belonged.

D. C. CAMPBELL.

MAMMALS.

Irish Bats.

Mr. Kane's interesting communication (p. 88) has led me to refer to my manuscript notes, and I find that, by some accident, not only did I omit his capture of *V. Nattereri* in Co. Galway, but also a record of the same species from Castlefreke, Co. Cork (see J. Ffolliott-Darling, *Zoologist*, 1883, p. 294), although both were entered in my original notes. The reference at bottom of p. 37 in my paper, to *Zoologist*, 1893, p. 294, should be *Zoologist*, 1883, p. 294. I regret that these mistakes escaped my notice when correcting proofs.

H. LYSTER JAMESON.

As Westmeath is excluded from Mr. Jameson's list of counties in which the Hairy-armed Bat (*l'esperugo Leisleri*) occurs, it may be of interest to state that the late Mr. A. G. More identified a bat of this species captured in a bedroom at Cromlyn, Westmeath, on the 16th of November, 1894. A memorandum of the fact is among Mr. More's papers, now in the possession of his sister, with whose consent I forward this note. The specimen was probably one of the last submitted for identification to the distinguished naturalist who had been for so many years the chief authority on the Fauna and Flora of Ireland.

C. B. MOFFAT.

PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a pair of white Guinea-fowl from Mr. J. Da'y, and two Diana Monkeys from Captain R. Irvine.

8,761 persons visited the Gardens in March.

DUBLIN MICROSCOPICAL CLUB.

MARCH 18.—The Club met at the house of Prof. G. A. J. COLE, who showed a section of volcanic ash from Montrose, Jamaica, containing a fragment of granite, doubtless exploded upward from some fundamental series through which the andesitic lavas broke. The specimen was furnished by the Institute of Jamaica.

Mr. F. W. MOORE showed *Nectria lagena*, Massee, a new species of *Nectria*, exhibited for the first time. It was found growing on a pseudo-bulb of *Odontoglossum Oerstedtii*, a native of Costa-Rica, cultivated in the cool Orchid house at Glasnevin. The plant had been in cultivation for several years, and hitherto this *Nectria* had not been found on it; in fact all the imported pseudo-bulbs had decayed away, and *Nectria lagena* was found growing on one which had been formed by the plant in its present quarters. It is a pretty and distinct species, of a bright orange red colour.

Mr. GREENWOOD PIM showed *Hysterographium Fraxini*, an interesting fungus growing usually on dead ash twigs. The spores were olive yellow, with numerous septa, both longitudinal and transverse, producing the structure called "muricate," from its similarity to masonry.

Mr. M'ARDLE exhibited the cell structure and plants of *Adelanthus decepti*ns, Hook., which he found on the shores of Lough Guitane, a new Kerry station, when collecting for the Flora and Fauna Committee of the Royal Irish Academy in November, 1893. The plant is one of the remarkable instances of a Hepatic common to Ireland, the West Indies, and the Andes of South America.

Dr. C. HERBERT HURST exhibited Edinger's Projection Apparatus made by Leitz. The light from a paraffin lamp after passing through a large condenser is reflected vertically downwards through a second condenser upon the microscopical slide, the second condenser being adjustable so as to concentrate the light upon just so much of the object as it is desired to "project." A second stage supports the projecting lens under the object, and the image is received on a white card below.

The utility of the apparatus for purposes of demonstration is very great, and with more powerful illumination it could be used even with very high magnification, as ordinary microscopical objectives may be used with advantage in place of the projecting lenses supplied with the apparatus. In its present form, however, the apparatus has some serious defects. It lacks rigidity, and the image is consequently displaced on

the card every time the projecting-lens is focussed—thus robbing the apparatus of its utility as a substitute for the camera lucida. The focussing pinion, moreover, moves the lens instead of the object, and every movement of it thus alters the magnification. No provision is made for holding an ordinary microscopical objective, and the lenses supplied, however good they may be for other purposes, are not projection-lenses and will only produce a sharp image of a small part of a flat object at a time—the result being that one hand has to be kept on the focussing-head during the whole time of demonstration unless the object be a very small one.

All these defects could easily be remedied without any great increase of the remarkably low price of the apparatus. The needs are:—Heavier and more rigid supports for stage and substage; rack and pinion adjustment to the stage instead of to the substage; an “adapter” to hold ordinary objectives; a better device for focussing the second condenser; a “tent” of black velvet or other opaque material to make the apparatus available in daylight.

Professor T. JOHNSON exhibited a preparation of *Ectocarpus pusillus*, Griff., a brown alga from Helwick Point (Dungarvan Bay) collected last October. The preparation showed plurilocular sporangia containing large non-motile spores, as discovered by Dr. Bornet whose illustrations were shown. The species is an addition to the Irish marine flora, made by Miss Knowles and the exhibitor.

Mr. W. N. ALLEN showed micrographs of several corallinaceæ.

Mr. G. H. CARPENTER showed *Aepophilus Bonnairei*, Sign., an interesting little marine wingless bug found beneath a stone between tide marks by Mr. A. R. Nichols, when collecting mollusca on the shore at Dungarvan, Co. Waterford, in September last. Recorded from the coast of Devon, Cornwall, the Channel Islands, and north-western France, its occurrence on the southern Irish shore might have been expected.

Mr. H. H. DIXON showed sections illustrating the second mitosis in the embryo-sac of *Lilium longiflorum*. The nuclear plate of the lower nucleus is formed of short straight chromosernes and in this respect resembles a heterotype division. The longitudinal fission of the chromosomes, however, conforms to the normal type and is simple. The V-shaped daughter chromosomes are not formed.

Mr. Dixon also exhibited sections of *Codium tomentosum* showing the numerous small nuclei of the coenocyte and a peculiar central column of some cellulose-like substance lying in the axes of the branches of the coenocyte.

Mr. J. N. HALBERT exhibited the female of a minute Hemipteron *Microphysa elegantula*, Bær., taken on old lichen-covered Blackthorns (*Prunus communis*) at Clonbrock, Co. Galway. The genus is remarkable for the striking dissimilarity of the sexes. *M. elegantula* being chiefly characterised by the extreme rudimentary condition of the elytra, which in the female, do not project beyond the base of the abdomen. The species seems to be very local this being the second record of its occurrence in Ireland.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

APRIL 6.—A lecture was delivered by Mr. Ernest W. MacBride, M.A., of Cambridge, on "Starfish and Sea Urchins: their Haunts, Habits, and History."

BELFAST NATURALISTS' FIELD CLUB.

MARCH 16.—Mr. WILLIAM GRAY, M.R.I.A., in the chair. The secretary was called on to read a short paper by Rev. H. W. Lett, A.M., on the "Re-discovery of the plant *Dryas octopetala* in County Antrim." Mr. Lett said that he brought the communication before the Club, as his discovery of the plant had been doubted. He had come across it in 1886, but owing to his being hard at work on mosses at the time it had escaped his memory until he turned it up in his herbarium. On publishing the circumstance the editors of the *Irish Naturalist* remarked that the record was not sufficiently authenticated. Mr. Lett, therefore, took the earliest opportunity of visiting the place on Sallagh Braes last November, where he found the plant still flourishing. The original specimen and also the 1896 one were placed on the table for inspection. Remarking on Mr. Lett's paper, Mr. S. A. Stewart said that if the editors of the *Irish Naturalist* had been somewhat sceptical about the discovery, it was only in order to ensure the most absolute accuracy, and their remarks had had the effect of placing the record beyond question by anyone. He heartily congratulated Mr. Lett on adding this interesting plant to our local flora. Mr. Gray then called on Mr. M'Cleery to read his paper on "An Evening with the Microscope." The paper, which was fully illustrated by a large number of lantern-slides, began by describing the action of the instrument itself and its parts, several photographs of typical microscopes being shown. The process of photo-micrography was also explained by means of lantern-slides. Mr. M'Cleery then proceeded to show a long series of beautiful slides made by Messrs. Donaldson, Firth, Stelfox, Welch, Gray, and by himself of various insects and their parts, such as flies, gnats, parasites of animals, eggs of butterflies, bees, wasps; also diatoms, foraminifera, and other objects, describing each slide and the reason it was shown. It was intended only to give the uninitiated some idea of the vast and beautiful field of work that lay before them, how varied it was, and with what ease it might be studied, and his object would be attained if he could induce someone to take up this fascinating study.

GEOLOGICAL SECTION, FEBRUARY 24.—The geological section met to see Mr. H. J. Seymour's demonstration of the admirable capabilities of the rock-slicing machine just presented to the Club by Messrs. Combe, Barbour & Combe. Thin slices of granites and other igneous rocks were successfully cut, and a thorough explanation of the methods of grinding and mounting rock-sections was given by Mr. Seymour. Arrangements for the forthcoming courses of petrology and field geology, and for a

large public lecture on "The Building of Ireland" by Prof. Cole, were also completed. A report on the raised beaches of the North-east of Ireland (*R. I. A. Proc.*), by Mr. R. L. Praeger, and specimens of granites from Shap and the Ross of Mull, from Mr. J. O. Campbell, were presented.

MARCH 6.—The beautiful weather favoured the geological members of the Club in an excursion over Squire's Hill. Winding round by the Horseshoe Road the "Black Quarry" was first visited; many specimens of basalt with stilbite, natrolite, apophyllite, chabasite, and other zeolites were obtained. Another quarry yielded biotite-pyroxene dolerite, and in a third much interest was aroused by some curious green masses believed to be the so-called "hullite" in a condition of decomposition differing from the well-known Carnmoney specimens. The party descended by the picturesque old Crumlin-road, enjoying the view of Lough Neagh sleeping in the evening light. Afternoon tea with Mr. and Mrs. Woodward at St. Mark's Vicarage terminated a successful excursion.

BOTANICAL SECTION. APRIL 10.—The Rev. H. W. Lett gave a lecture on Grasses and Sedges introductory to the study of this interesting but difficult class of plants. It was well illustrated by an extensive set of specimens from his own herbarium.

DUBLIN NATURALISTS' FIELD CLUB.

MARCH 9TH.—The President (Prof. COLE, F.G.S.) in the chair. Mr. GREENWOOD PIM, F.L.S., read a paper entitled "Strange animals, old and new," illustrated by lantern slides he had made from plates in a 17th century natural history book (Johnson's "Historia Naturalis") and from the recently published Royal Natural History of Lydekker. The paper illustrated the advisability of keeping an open mind as to the kind of animal that could or not exist and the necessity of careful observation of the actual specimens for accurate illustration.

The Secretary (Prof. T. JOHNSON, D.Sc.), read a paper by Miss M. C. KNOWLES and himself on Seaweeds from the S.E. of Ireland. Early in October Mr. Nichols and the Secretary went for a week to Dungarvan and district to collect marine shells and algae on behalf of the Royal Irish Academy Flora and Fauna Committee. Their work was much facilitated by the arrangements made by R. J. Ussher, J.P., of Cappagh, and Mr. Symmonds of Dungarvan. The week, that in which the Daunt's Rock Lightship went down, was one of gales and rainstorms, and dredging was carried on under difficulties. The paper was devoted to the results of the investigation by Miss Knowles and the Secretary of the sea-weeds collected. In addition to a number of common species 90 species have been so far identified of which the more interesting are *Dermocarpa prasina*, *Spirulina subsalsa*, *Hyella caspiflora*, *Mastigocoleus testarum*, *Chlorochytrium inclusum*, *Bolbocoleon piliferum*, *Epicladia Flustræ*, *Entoderma viride*, *Halicystis ovalis*, *Gomontia polyrhiza*, *Strebionema velutinum*, *S. solitarium*,

S. luteolum, *S. minimum*, *S. reptans*, and two other species one of which is, and the other may be, according to Sauvageau, new to science; ten species of *Ectocarpus*, *Aglaosonia reptans*, *Goniotrichum elegans*, *Choreocolax Polysiphonie*, *Gigartina acicularis*, *Nitophyllum reptans*, *Rhodochorton membranaceum*, and several species of *Melobesia*. The paper was illustrated by lantern and by microscopic slides and specimens. The Secretary expressed his high appreciation of the devoted way in which Miss M. Knowles had carried on the examination of the seaweeds from Dungarvan Bay.

The following were elected members:—Miss Barnard, Miss Cragg, Mrs. Deaker, Miss Longford, W. H. MacM. Phelan, J. Trumbell, Miss Wann.

Miss Devenish sent for exhibition fruits of *Trapa bicornis*.

APRIL 13.—The President (PROF. COLE, F.G.S.) in the chair. Dr. C. J. PATTEN gave an interesting paper on the Ornithological fauna of Dublin Bay, with numerous lantern illustrations. Dr. Patten gave a list of fifty-six kinds of birds observed, accompanied by natural history notes. The paper dealt more especially with the wading birds, their gregarious, swift-flying, migratory habits, and associated structural adaptations being noted. Prof. Cole and Messrs. Dowling, Palmer, Knox, and E. Williams, spoke on the paper.

Mr. A. R. NICHOLS, B.A., read a paper on the Recent Mollusca of Ireland. The paper was fully illustrated by specimens and lantern slides. The structure and general classification of the Mollusca were considered, special attention being called to the Irish representatives of the different groups. The distribution of the Irish Marine Molluscs was also described, the sea-shore at Portmarnock and Malahide being noted as rich localities.

Dr. A. H. FOORD, F.G.S., whose illness prevented his attendance, sent for exhibition a specimen of a unique spine-bearing fossil nautilus, collected by himself in the Clane quarries, Co. Kildare. Mr. NEALE sent for exhibition a lantern slide of a Porbeagle shark taken in a fishing net, off Slea Head, Co. Kerry. Mr. J. G. ROBERTSON exhibited a fossil fish from the Kilkenny coalfields. Prof. Cole invited photographic members of the Club to join in an attempt to make a photographic survey of Co. Wicklow (see page 125), on the lines adopted by a British Association Committee for the United Kingdom in general. The attention of the meeting was called to the collection of beautiful illustrations of Irish Crosses, made by Miss Margaret Stokes. Five members were elected, as follows:—H. Powell, Miss Campbell, Brigade-Surgeon J. Kelly, Miss McCarthy, W. H. Lee (transferred). Three candidates were nominated for election.

BOG-BURSTS, WITH SPECIAL REFERENCE TO THE RECENT DISASTER IN CO. KERRY.

BY R. LLOYD PRAEGER, B.E.

[Read before the Dublin Naturalists' Field Club, 9th February, 1897.]

IN the early hours of the morning of 28th December, 1896, the Knocknageeha bog, situated at the head of the Ownacree valley, seven miles N.N.E. of Headford, near Killarney, burst, and discharged a fluid mass, which, pouring down the valley of the Ownacree, devastated the surrounding country in its course.

Without loss of time the Royal Dublin Society appointed a committee, consisting of Professor W. J. Sollas, Dr. A. F. Dixon, Mr. A. D. Delap, and myself, to investigate and to report on the phenomenon. The Committee left Dublin on the afternoon of Friday, January 2nd, and devoted the following three days to the work.

Our report was presented to the Society on 20th January¹. This evening I can best bring the subject under your notice by reading extracts from that report, and exhibiting on the screen maps and sections of the place, and photographs taken by Dr. Dixon, adding such comments as may be necessary for their elucidation.

A dry summer had been followed by a wet autumn, and, about nightfall on December 27th, a heavy downpour of rain set in, accompanied by a south-easterly gale. Somewhere between two and three o'clock the following morning, the edge of the bog, which overlooks the Ownacree valley, gave way, and liberated a vast flood of peat and water. There was no immediate warning of the catastrophe, and no one witnessed the actual rupture.

Although the outburst was clearly not instantaneous, it evidently proceeded with great rapidity, as is witnessed by the circumstances of a lamentable loss of life. The bog gave way along the line of a turf-cutting from 4 to 10 feet deep, parallel

¹The Report of the Committee will be found in *Scientific Proceedings, R.D.S.*, vol. viii. (n.s.), part v., No. 57. The illustrations which accompany the present paper are taken from this Report, by kind permission of the Royal Dublin Society.

to which, and about 300 yards below it, runs the Kingwilliams-town road. A small stream, coming from the bog, passes under this road. Close by this stream, on the lower side of the road, was situated the house of Cornelius Donelly, Lord Kenmare's quarry steward ; it was of the ordinary type, of one storey, with walls of rubble masonry and a thatched roof ; it stood about 12 feet below the level of the road, and at a short distance from it, the intervening space being occupied by a garden. The house was entirely swept away ; Cornelius Donelly, his wife, and family of six children all perished ; the bodies of some of them, and those of their live-stock, together with articles of furniture, were carried down the valley, and were found at various points along the course of the flood, a portion of one of the beds being picked up, a few days later, in the Lake of Killarney—fourteen miles away. From the fact that the whole family perished, and that those bodies which were recovered were without clothing, it would appear that the rapidity with which the flood rose was so great as to afford them no chance of escape.

After bursting from the face of the turf-cutting already mentioned, the first obstacle the flood encountered was the road leading to Kingwilliamstown ; it overwhelmed this for a width of a quarter of a mile, and continued its course to the road to Killarney, a short distance below, pouring, as it passed, a small cataract of mud into the old quarry at the cross-roads. The Carraundalkeen, a small streamlet, tributary to the Ownacree, passes under the Killarney road, through a culvert about 8 feet by 5 feet ; this was speedily blocked with masses of turf, and the rising flood poured across the road, carrying away the tall hedges on both sides that stood in its course on its eastern side. On both this and the Kingwilliams-town road huge masses of the more coherent upper crust of the bog were left stranded. A short distance further down, on the northern side of the Carraundulkeen valley, is situated a valuable limestone quarry, which the flood filled to a depth of 15 or 20 feet ; as it impinged on the lower corner of the entrance, it surged up in a great wave 3 or 4 feet above the highest level within the quarry, which is marked as a horizontal line along the quarry walls. Beyond the quarry it continued down the valley for a straight run of three-quarters of a mile, to enter, almost at right angles, the valley of the

Ownacree or Quagmire river. Checked, as it encountered the opposing side of this valley, the flood rose along its middle line, where its velocity was greatest, 8 feet above its sides. A small cottage stands near by, and its floor is 5 feet below the maximum height of the flood. It owes its escape to the fact that it is situated about 100 yards on one side of the middle line of the flow. After entering the main valley, the flood continued its career for a mile and a half to Annagh Bridge, where the Ownacree meanders through flat bog and meadows. These, and the road which crosses the bridge, were inundated, and the muddy fluid broadened out into a black lake, half a mile in length by 600 yards in breadth. A breach was made in the road close beside the bridge. On the margin of the submerged flat stands the cottage of Jeremiah Lyne; he and his family had a narrow escape. The flood, in its downward course, encountered the back of the cottage, and rose against it 5 feet, sweeping two haycocks, which stood behind the house, round to the gable. The family were awokened by water pouring in. They were unable to unbar the door owing to the pressure of 3 feet of fluid, and escaped by climbing through the window and wading to higher ground.

Below Annagh Bridge, the force of the flood was less felt. At Barraduff Bridge, "Six-mile Bridge" of the Ordnance map, where the Ownacree joins the Beheenagh river, the Ownacree is 20 feet wide, and the flood rose 8 feet; below the junction the stream is 30 to 50 feet wide, and the flood rose 6 feet; at Six-mile Bridge it rose to the top of the arches, 10 feet above its normal level; at the bridge two miles below Headford, the level of the flood was about 4 feet above the stream, and finally at Flesk Bridge, near the Lake of Killarney, one foot.

The flood attained its maximum height during its first great outburst in the dark hours of Monday morning. At daybreak, the roaring flood of black fluid, bearing on its surface huge masses of the lighter crust of the bog, had already become confined to the central portions of the valley, but still ran across the road and over the site of Donnelly's house. The flow, which continued with constantly diminishing violence for the whole of Monday, was not regular, but intermittent,

swelling and diminishing as fresh portions of the bog gave way, and slid downwards into the torrent. Every fresh outburst was accompanied by loud noises, likened by bystanders to the booming of big guns or the rumbling of thunder. Over the sides of the valley the settlement of the peaty part of the fluid had already taken place, and, as drainage continued, it increased somewhat in consistency. The disruption of masses of bog continued at intervals down to Friday, January 1st. When we visited the scene on Saturday, January 2nd, the flow had lost its torrential character, but a turbid stream, many times increased beyond its usual volume, occupied the river bed. Mr. James Barbour, who visited the place on Saturday, January 8th, reports that one could then have stepped across the stream, so that by this time it must have shrunk to nearly its usual size.

The district in which the bog is situated forms the southern portion of a high and undulating area of Coal-measures, generally bog-covered, and attaining a height of over 1200 feet, some miles to the north-west. That part of the bog in which the outburst took place is about 750 feet above the sea; it forms the watershed, and drains eastwards into the river Blackwater, and west into the Ownacree. To the north-east the bog descends in a gentle slope towards the Tooreencahill stream, a branch of the Blackwater; to the north-west towards the main branch of the Ownacree, and westward towards the Carraundulkeen streamlet, into which it burst. Judging from the size of the valley in which this branch flows, it would appear that the greater part of the bog drained into the last-mentioned stream. At the inquest evidence was given that a "wet vein" existed in the bog continuing the direction of this stream. It is of interest to observe that the bog rests partly on Coal-measures, and partly on Carboniferous limestone, which is brought up by an anticlinal, and separated from the Coal-measures by a fault, which runs for some miles east and west, through the very middle of that part of the bog, which lies adjacent to the outburst.

The bog, like most others, possessed a convex surface; it extended in three arms, which sloped downwards in the three directions of drainage already specified. In all other directions it is bounded by gently rising cultivated land. It was not

drained by any superficial streams, nor was any large amount of water discharged at any point from beneath. The “wet vein” already mentioned was evidently a line of drainage.

The peasantry state that the surface of the bog was exceptionally soft; they admit, however, they could walk across it in the middle of winter. The flora of the bog shows that it was no wetter than bogs usually are. The plants which form its surface are members of the normal bog-flora. The vegetation consists of a tangle of *Calluna Erica* (Ling), *Erica Tetralix* (Cross-leaved Heath), *Narthecium Ossifragum* (Bog Asphodel), *Scirpus cespitosus* (Club-rush), and *Molinia varia* (Purple Melic grass), with the usual abundant undergrowth of bog-mosses, of which *Sphagnum rubellum* is the prevailing species, while *S. cuspidatum*, var. *plumosum*, fills the numerous shallow pools, which, as usual, were scattered over the surface. Tufts of the moss *Racomitrium lanuginosum* were frequent, and the lichen *Cladonia rangiferina* (Reindeer moss) was abundant, mixed with the hepatic *Pleurozia cochleariformis*. The above list furnishes satisfactory evidence that the surface of the bog was not unusually wet; indeed, the plants characteristic of wet bogs, such as *Andromeda polifolia* and *Schollera Oxycoccus* (Cranberry), though searched for, were not to be found.

The bog had been cut for turf in two places—on the north-eastern slope, which faces towards the Blackwater, where the cuttings were of no great extent; and along the western edge, where, as already stated, they formed an irregular line, running parallel to the Kingwilliamstown road. It was from the latter cuttings that much of the local fuel was obtained.

This cutting does not appear to have been judiciously planned, except at the southern end, where it extended in wedge-shaped gashes into the bog; but for the rest of the distance it was cut in an irregular line, transverse to the line of drainage.

An evidently faithful description of the bog, as it existed in 1811, is given by Mr. Nimmo¹ in his account of the bogs of Kerry and Cork.

¹ Appendix to Fourth Report of the Commissioners appointed to inquire into the nature and extent of the several bogs in Ireland, and the practicability of draining and cultivating them: ordered by the House of Commons to be printed 28th April, 1814, p. 84.

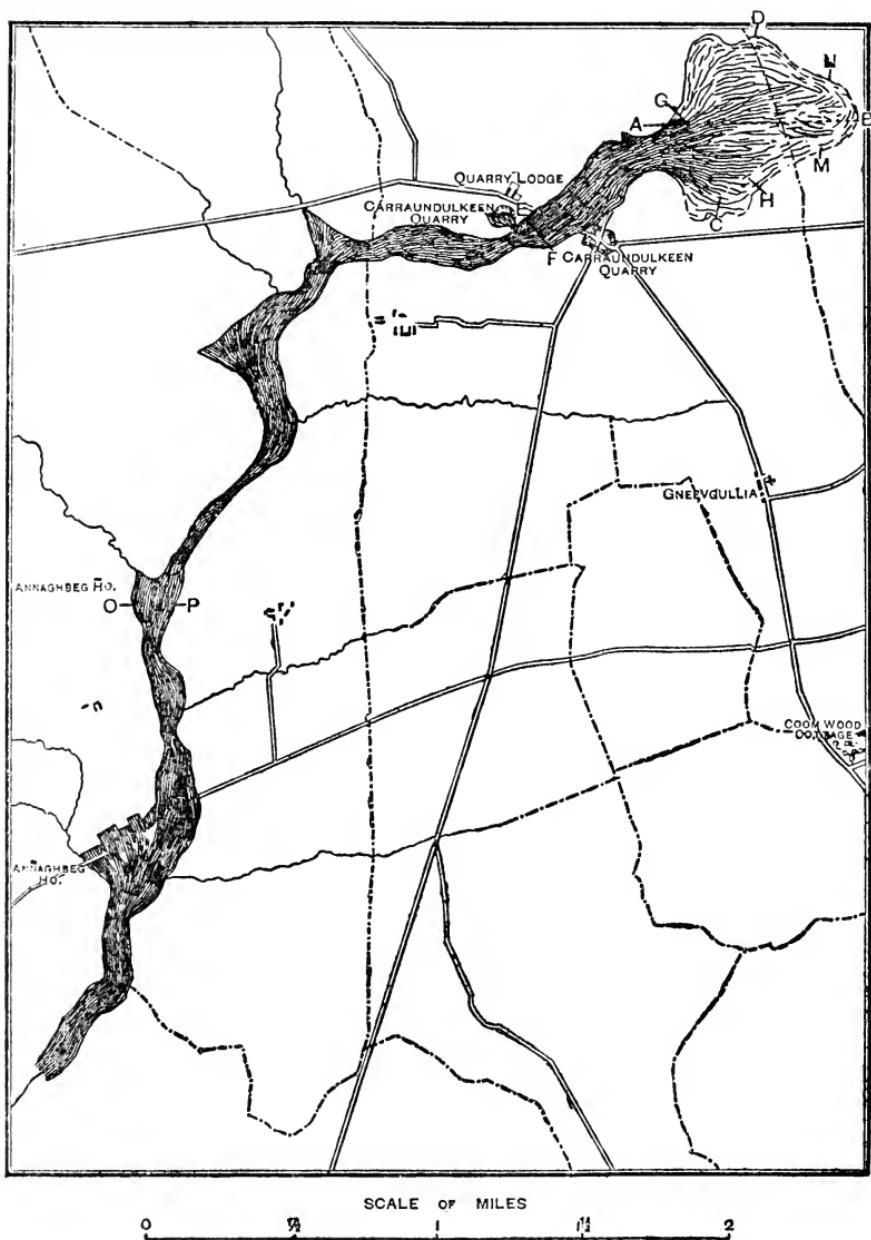


FIG. I.

Map showing the subsided portion of the bog, and the area over which peat has been deposited in the valley of the Ownacree. The letters A to P indicate the directions in which the sections shown in figs. 2 and 3 were taken.

Under the estimate of the cost of a scheme for draining the bog, we find the following interesting item:—"Two cuts into a swamp on the summit, 304 perches at 3s. 6d., £53 4s."

Mr. Leonard, Lord Kenmare's agent, states that on visiting the bog at mid-day on Monday, about eight hours after the outburst, its surface for about a mile above the site of the turf-cutting was no longer convex but level. As the escape of fluid material continued, the surface correspondingly sank, till a shallow saucer-shaped depression was formed, opening by a narrow trough into the Carraundulkeen stream. At each side of the mouth of this trough there could still be seen the undisturbed ends of the turf-cutting; the central portion, for the width of a furlong, had disappeared. Looking eastwards from this point, a wide, broad valley appeared to extend upwards into the bog. On January 2nd, when we saw it, this depression was 7 furlongs in length by 5 furlongs wide, with a maximum depth of 28 feet. From careful inquiries it would appear that the former elevation of the centre of the bog above the undisturbed edge of the depression was about 7 feet, so that the total subsidence amounted to no less than 35 feet. The margin of this collapsed portion of the bog was clearly marked, so that we had no difficulty in tracing it on the 6-inch map. The slope near the side was comparatively steep, lessening towards the middle; the steep margin was marked by concentric fissures, which, when of sufficient width, were occupied by great masses of "sludge" which had risen from below. Near the margin, the area of these crevasses, as compared with that of the still remaining upper surface, was about 1 : 3; the proportion increased to about 2 : 1 near the centre, where also the fissures were no longer concentric, owing to the fact that a definite flow of the whole mass of the bog had taken place down the valley. Over the two areas marked on the map by close parallel lines, the surface had entirely disappeared. Walking round the margin of the depressed area, it was observed that, in addition to those portions which originally sloped towards the Ownacree, other adjoining areas, which previously had sloped towards the east and north, had shared in the general subsidence, and now formed a part of the newly-formed valley which we have described as opening to the westward through the former turf-cutting.

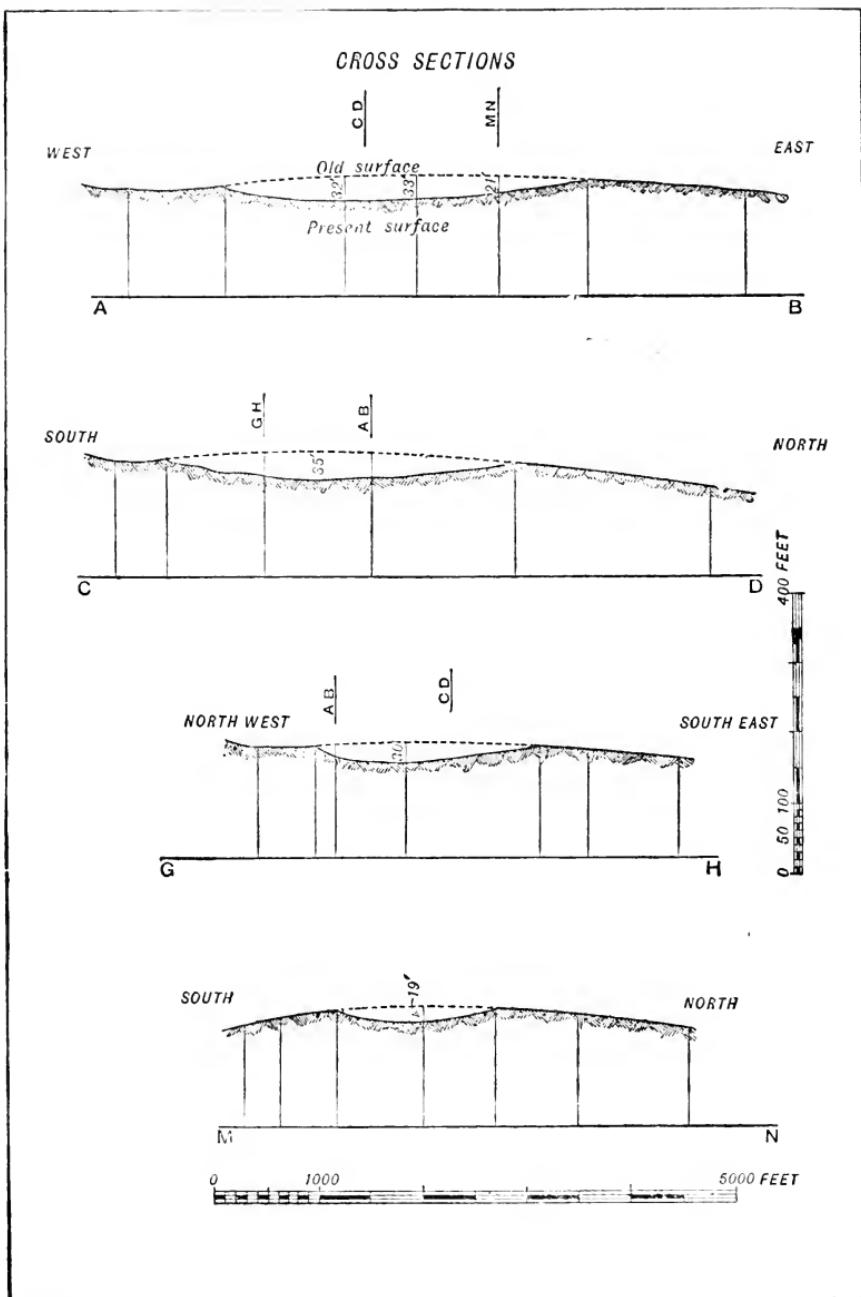


FIG. 2.

Sections through the bog of Knocknageeha. Vertical scale, 6 times the horizontal.

This curious feature will be clearly seen from the sections of the bog given in figs. 2 and 3. A striking indication of this reversal of slope was furnished by several shallow surface drains which had been cut in order to dry the surface of the bog for turf-cutting at its eastern extremity. These, when made, had a slope of one in forty towards the Blackwater valley; they were now broken across, so that what had been the upper half sloped with an equal gradient towards the Ownacree. It was along the southern edge of the basin that the greatest amount of marginal disturbance had taken place, the proportion of crevasses to crust here being quite 2 : 1. This appears to have been the shallowest portion of the bog; several ridges of the underlying gravel had somewhat disturbed the general subsidence of the peat. The portion overlying the crests of the ridges had remained *in situ*, while that on their slopes had broken away on both sides, and flowed down through the depression between them. Soundings with a pole in these depressions showed hard bottom at from 5 to 8 feet. This was the only place where an 8-foot pole gave an indication of bottom. Owing to the increase in the number and width of the crevasses, on entering the depression from its margin, it was quite impossible to make any observations from more than 20 or 30 yards inwards from the edge. But there appears to be no doubt that along the line of greatest depression, the thick covering of bog had been entirely removed; in some places the hard bottom could be seen.

Immediately above the Kingwilliamstown road we pass from the area of subsidence to the region of flow. The flood has left behind it, in the upper portion of the valley, a deposit of peat averaging 3 feet in thickness, here as everywhere contrasted by its black colour with the grass land or other surface on which it rests. Its compact convex margin, like that of outpoured oatmeal porridge, often 2 feet in height, serves equally well to define it; so that it was an easy task to determine and map the high-water level of the flood. The surface of the deposit was everywhere broken by great roots and trunks of Scotch Firs, which, in their enormous numbers, bore convincing testimony to the evisceration which the bog had undergone. The appearance of this extensive sea of black peat, with its protruding stumps of blackened trees, overlying fertile fields, was a sight melancholy in the extreme.

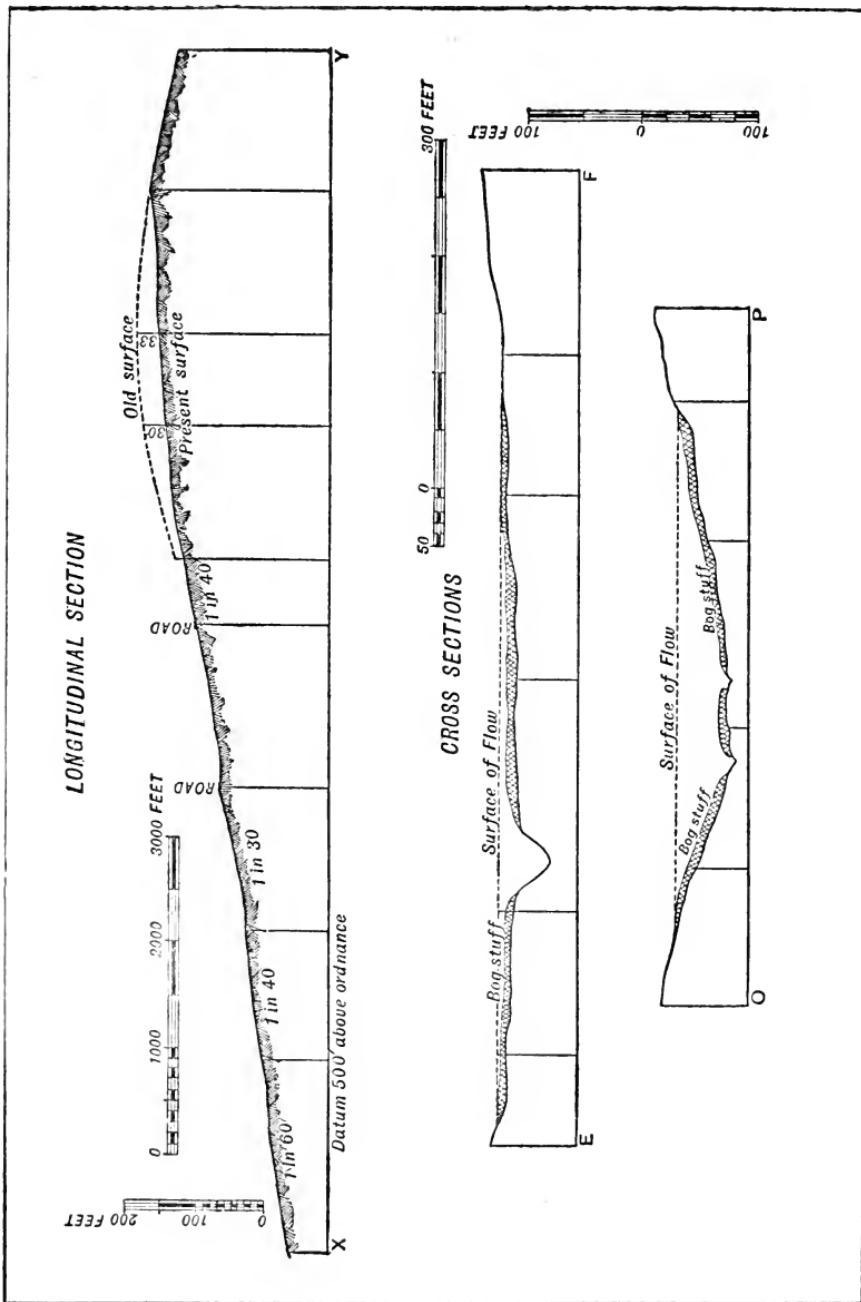


FIG. 3.

Longitudinal section through the subsided area and the course of the flood. Cross-sections across the valley of the Ownacree, to show the height attained by the flood and the deposit of peat.

The presence of so much floating timber in the waters of the flood must have greatly enhanced its destructive power. One of the largest of these trees, a huge stump with roots 12 feet across, was seen lying some distance up the course of a tributary stream, and on the top of its overhanging bank, at a distance of two and a half miles from the scene of the outbreak.

The erosive effects on the bed of the Owenacree are well marked. We observed places where it had been lowered 6 feet; *e.g.* at a spot about half a mile from Annagh Bridge; a lane which had extended across this as a shallow ford, had been cut through by a trench, 20 feet in width and 6 feet in depth. In other places the stream has cut for itself a new course.

The lamentable fate which overtook the Donelly family has been already alluded to. Many farmers have suffered serious loss by the tearing up and washing away of their potato-pits, which were situated near the banks of the stream. The filling up of the limestone quarry is a serious inconvenience; for, although the work of clearing it out has been already commenced, and it will ultimately be worked as before, it must remain useless for some time. No other quarry exists in the neighbourhood, and lime is the only manure in universal demand. The roads can be cleared without much difficulty: the breaches made in them are not serious. The farmers will feel most seriously the loss of their land. On most of the holdings the best land was situated along the river banks, and, in the upper portions of the valley, this is now covered to a depth of 3 feet with a solid deposit of peat. At Annagh Bridge the average depth has decreased to 2 feet; here the deposit is of a finer grain and more liquid. According to the inquiries made by the police, in the four townlands which occupy the east bank of the river between the scene of the outburst and a point a little below Annagh Bridge, close on 300 acres of land have been thus buried.¹ The tenants being all small holders, the loss of their best grazing has ruined them.

Strange and contradictory rumours are prevalent among the peasantry as to whether any symptoms of the approach-

¹ *Freeman's Journal*, January 2nd.

ing catastrophe were noticed. Sergeant King, R.I.C., states positively that he and other officers on patrol heard rumbling noises some days before the occurrence. Further, it is certain that some of the peasantry were so alarmed by sounds, which they attributed to the banshee, that the parish priest was sent for to pray with several families.

The evidence as to whether the actual bursting of the bog was accompanied by sounds is conflicting. Some state that they were awakened by a loud roar; others, including Mr. MacSweeney, of Quarry Lodge, slept as usual. But this negative evidence is of little or no value; for, in one instance, the flood passed within fifty yards of a cottage, breaking down and sweeping away the trees of the adjacent haggard, without arousing the occupants.

It is obvious that, before the outbreak, the condition of the bog was that of a viscous fluid enclosed within a resistant wall. The pressure of the fluid and the tension of the envelope were then in equilibrium. Owing to an increase in pressure or a decrease in the tensile strength of the retaining wall, this equilibrium was destroyed, the envelope was ruptured at its weakest part, and the viscous fluid, under a head of pressure, rushed down the inclined surface provided by the natural drainage of the country.

Before entering further into the discussion of the causes which led to the outburst, it will be convenient to present here information we have collected concerning similar occurrences which have taken place in the past. We give first a list of those which have affected the bogs of this country; they are arranged in chronological order.

A.D. 1697, June 7. *Kapanihane Bog, Co. Limerick, near Charleville.*—This occurrence is so quaintly described in a letter, dated June 7, 1697, that it is worth quoting *verbatim et literatim* :—

"On the 7th Day of June, 1697, near Charleville, in the County of Limerick, in Ireland, a great Rumbling, or faint Noise was heard in the Earth, much like unto a Sound of Thunder near spent; for a little Space the Air was somewhat troubled with little Whisking Winds, seeming to meet contrary Ways: And soon after that, to the greater Terror and Afrightment of a great Number of Spectators, a more wonderful thing happened; for in a Bog stretching North and South, the Earth began to move, viz. Meadow and Pasture Land that lay on the side of the Bog, and separated by an extraordinary large Ditch, and other Land on the further side adjoining to it; and a Rising, or little Hill in the middle of the Bog hereupon sunk flat.

"This Motion began about Seven of the Clock in the Evening, fluctuating in its Motion like Waves, the Pasture-Land rising very high, so that it over-run the Ground beneath it, and moved upon its Surface, rowling on with great pushing Violence, till it covered the Meadow, and is held to remain upon it 16 Feet.

"In the Motion of this Earth, it drew after it the Body of the Bog, part of it lying on the Place where the Pasture-Land that moved out of its Place it had before stood; leaving great Breaches behind it, and spewings of Water that cast up noisom Vapours: And so it continues at present, to the great Wonderment of those that pass by, or come many Miles to be Eye-witnesses of so strange a thing."

This communication was accompanied by a map and detailed description by John Honohane.¹

A.D. 1708. *Castlegarde Bog, County Limerick.*—The Castlegarde bog, or as it was then called Poulevard, moved along a valley and buried three houses containing about twenty-one persons. It was a mile long, a quarter mile broad, and about 20 feet deep in some parts. It ran for several miles, crossed the high road at Doon, broke through several bridges, and flowed into the Lough of Coolpish.²

A.D. 1745, March 28.—*Bog of Addergoole, Dunmore, County Galway*—About mid-day, after a heavy thunder-shower, about 10 acres of bog, the front of which was being cut for turf, moved forward and down the course of a stream, and subsided upon a low pasture of 30 acres by the river-side, where it spread and settled, covering the whole. The stream, thus dammed back, rose till it formed a lake of 300 acres, which, by the cutting of a channel, was subsequently reduced to 50 or 60 acres. This area, together with the 30 acres of meadow over which the bog spread, has been destroyed for purposes of husbandry.³

A.D. 1788, March 27.—*Bog near Dundrum, County Tipperary.*—“A large bog of 1500 acres, lying between Dundrum and Cashel, in the county of Tipperary, began to be agitated in an extraordinary manner, and to the astonishment and terror of neighbouring inhabitants. The rumbling noise from the bog gave the alarm, and on the 30th it burst, and a kind of lava issued from it, which took its direction towards Ballygriffen and Golden, overspreading and laying waste a vast tract of fine fertile land belonging to John Hide, Esq. Everything that opposed its course was buried in ruins. Four houses were totally destroyed, and the trees that stood near them torn up by the roots. The discharge has been incessant since the 30th, and how far it will extend cannot at present be determined.”⁴

¹ *Philosophical Transactions*, vol. xix., pp. 714–716, October, 1697; and *Boate, Molyneux, and others, a Natural History of Ireland*, p. 113, 1755.

² *Dublin Evening Telegraph*, 2nd January, 1897.

Ouseley, Trans. R.I.A., vol. ii., *Science*, pp. 3–5, plate I., 8187.

³ *Gentleman's Magazine*, vol. lviii., p. 355, 1788.

A.D. 1809, December 6.—*Bog of Rine, Camlin River, County Longford.*—“In the night, during a thunderstorm, about 20 acres of the bog burst asunder in numerous places, leaving chasms of many perches in length, and of various breadths, from 10 feet to 3 inches. The rifts were in general parallel to the river, but in some places the smaller rifts were at right angles to it; not only the bog, but the bed of the river was forced upward; the boggy bottom filling up the channel of the river, and rising 3 or 4 feet above its former banks. In a few hours 170 acres of land were by these means overflowed, and they continued in that state for many months, till the bed of the river was cleared by much labour and at considerable expense.” The bog had been an unusually wet one. It did not sink in any particular place. “Several earthquakes were felt in distant countries about 16th December, . . . and it is not absolutely impossible that a communication may exist between them” [the earthquake and the bog-slide].¹

A.D. 1819, January.—*Owenmore Valley, Erris, Co. Mayo.*—“A mountain tarn burst its banks, and heaving the bog that confined it, came like a liquid wall a-down, forcing everything along, boulders, bog timber, and sludge, until, as it were in an instant, it broke upon the houses [of a small village], carrying all before it, stones, timbers, and bodies, and it was only some days after, that at the estuary of the river in Tullohan Bay, the bodies of the poor people were found.”²

A.D. 1821, June 26.—*Bog of Kilmaleady, near Clara, King's Co.*—The excellent report on the outbreak of this bog, communicated to the Royal Dublin Society by Sir Richard Griffith, may with advantage be consulted by those who are interested in the subject. It will be found in the *Journal of the Royal Dublin Society*, vol. I., pp. 141-144 and map, 1858.

Sir William Wilde gives the following additional particulars taken from the daily press of the time:—

“At 7 p.m., of the evening of the 26th June, the south front of the bog of Ballykillion, or Kilnalady, gave way to a depth of 25 feet, and with a tremendous noise, commenced to move down the valley at the rate of about 2 yards an hour, with a front 200 yards wide, and about 8 feet deep. . . . It continued to move for more than a month.

“About the same time the Ferret bog, about 16 miles north-east of Kilnalady, was strongly agitated, boiling up to a great height.”³

A.D. 1821, September.—*Joyce Country, County Galway.*—“Upwards of a hundred acres of land, on which crops were growing and several families resided, were heard to emit a sound resembling thunder; the earth then became convulsed, and eventually this large tract moved down towards the sea, leaving the whole route over which it passed a complete waste.”⁴

¹ Edgeworth, App. 8 to 2nd Report of Bog Commission, p. 176, 1811.

² Otway, “Sketches in Erris and Tirawley,” p. 14, 1841.

³ Census of Ireland for the year 1851, part v., vol. i., 1856, pp. 189, 190.

⁴ *Ibid.*, p. 90.

A.D. 1824, December 22.—*Bog of Ballywindelland, Coleraine.*—A portion of this bog containing 80 or 100 acres gave way and passed into an adjoining valley: it gradually advanced on the firm land, during the day, at the rate of 2 feet per minute.¹

A.D. 1831, January.—*Bog near Geevagh, Co. Sligo.*—“After a sudden thaw of snow, the bog between Bloomfield and Geevagh gave way; and a black deluge, carrying with it the contents of 100 acres of bog, took the direction of a small stream, and rolled on with the violence of a torrent, sweeping along heath, timber, mud, and stones, and overwhelming many meadows and arable land. On passing through some boggy land, the flood swept out a wide and deep ravine, and a part of the road leading from Bloomfield to St. James’s Well was completely carried away from below the foundation for the breadth of 200 yards.”²

A.D. 1835, September 17.—*Fairloch Moss, Randalstown, Co. Antrim.* (A very large bog overlooking a valley.)—All day a portion of it swelled up till the convexity was 30 feet in height; at 5 p.m., with a sound like a loud, rushing wind, it sank several feet, and a collection of tufts, mud, and water moved N.E., not rapidly, and soon stopped. It swelled up again, and about midday on the 19th, it again burst with a similar noise and the flow crept on till the 21st, when it ceased till the 23rd, being interrupted by ditches; on the 23rd, at 3 p.m., it suddenly rushed forward. Continuing, it surrounded a cottage 10 feet deep, rose over the Belfast-Londonderry coach road, crossed it with a width of 300 yards, and poured over the far bank in a cascade, and continued down the valley till it reached the River Maine, which it dammed temporarily, and killed all the fish. The flow into the Maine did not cease till Sept. 28. The deposited area of bog was three-quarters of a mile long, and 200 to 300 yards wide, with a maximum depth of 30 feet. The place where the bog had swelled up to 30 feet, afterwards sunk 20 feet below its original level, and a small pool occupied the hollow.³

A.D. 1840, January.—*Bog of Farrendoyle, Kanturk, Co. Cork.*—The bog was 10 feet in thickness, resting on a substratum of yellow clay; the pent-up water undermined a prodigious mass of bog, and bore it buoyantly on its surface; twenty acres of valuable meadow were covered, and a cottage was propelled and engulfed; a quarter of a mile of the road from Kanturk to Williamstown was covered 12 to 30 feet deep.⁴

A.D. 1870, December 14, 9 a.m.—*Bog near Castlereagh, Co. Roscommon.*—The bog is situated 5 miles north-east of Castlereagh, on the watershed of the River Suck and the Owen-na-foresha, a tributary of Lough Gara; it overlies cavernous limestone. The eruption took place from the face of a turf-cutting, which was from 12 to 15 feet in height. A

¹ *Ibid.*, p. 198.

² Lyell, “Principles of Geology,” 10th ed., vol. ii., p. 504.

³ Hunter, *Magazine of Nat. Hist.*, vol. ix., May, 1836, pp. 251-261.

⁴ *Freeman’s Journal*, January 3, 1840 (copied from the *Cork Standard*).

very rapid flood of peat and water poured forth, bearing on its surface large masses of the crust of the bog ; it rose 10 feet over Baslick Bridge, and left a deposit of peat, which covered 165 acres of low ground and extended for some 6 or 7 miles down the valley of the Suck. A valley was formed in the peat bog half a mile in length and 20 feet deep.¹

A.D. 1873, October 1.—*Bog 3 miles east of Dunmore, Co. Galway.*—The bog was connected with the Dunmore river by the Carrabel, a small stream. It was considerably elevated above the surrounding country, its edges presenting the appearance of high turf banks. “A farmer digging potatoes suddenly observed a brown mass slowly approaching. Leaving his spade in the ground, he went for the neighbours, and on his return the mass of moving bog had half covered his potato field, and completely hidden his corn field from sight, except a few stacks which remained on a knoll, an island in the midst of a scene of desolation.” The bog slowly flowed down the valley of the Dunmore, burying three farm-houses, and covering about 300 acres of pasture and arable land, 6 feet deep. The peat was cut along a perpendicular face, 25 to 30 feet in height, which extended down to the underlying gravel. It was from this cutting that the outburst took place. The flood of peat and water moved rapidly at first, but afterwards slowly, and continued in movement for 11 days. It carried away roads and bridges. The subsided portion of the bog extended eastwards from the face of the cutting for a distance of a quarter of a mile; its greatest breadth measured also a quarter of a mile; down the middle, a valley from 20 to 25 feet deep was formed, and about the sides the crust was torn asunder. The numerous crevasses so formed were filled to the top with black peaty fluid.²

A.D. 1883, January 25.—*Bog near Castlereagh, Co. Roscommon.*—“The bog was situated between the villages of Moor and Baslick; in about two hours it moved a mile in a south-westerly direction towards the River Suck; after a short interval the movement continued, some 4,000 acres of land were covered, three houses had to be deserted, several roads were blocked; the Ballinagare-road being covered 15 feet deep. Eleven or twelve years ago the Tulla bog, situated about a quarter of a mile from the scene of the present outbreak, burst and discharged itself into the river Suck.”³

A.D. 1883, January 30:—*Bog near Newtownforbes, Co. Longford.*—“A bog near Newtownforbes has commenced to migrate, covering turf and potatoes.”

¹ Report to the Board of Public Works, by Mr. Forsyth, 26th and 28th January, 1871.

² Savage, “ Picturesque Ireland,” pp. 234-235, illustr. (n. d.)

³ Report to the Board of Public Works, by Mr. Forsyth, 31st October, 1873.

⁴ *Freeman's Journal*, January 27, 30, and 31, 1883.

⁵ *Ibid.*, January 31, 1883.

A.D. 1890, January 27.—*Bog at Loughatorick North, Co. Galway.*—The bog is situated in the townland of Loughatorick North, on the Slieve Aughthy Mountains, nearly on the watershed, and 300 feet above Ballinlough Lake, which lies N.E., and into which the bog drains by a small river. The bog consists of two portions, separated by a narrow neck, where exposed rock was seen after the outburst. The upper and larger part is 70 acres in extent, the lower only 15 acres. The latter began to move 3 days before the upper portion; in its centre was a small lake to which an underground stream could be traced; after the outburst, this lake became dry. After a fall of snow, a sudden thaw set in on the 24th January; three days later a movement of the bog commenced, and continued till 1st February. Great masses of peat were carried away by the black flood into Ballinlough Lake, which was nearly filled with peat and the outwashed trunks of trees. The lowlands were covered with peat over an area of 100 acres, and for a depth of 12 inches. Traces of the flood were visible to a height of 6 or 7 feet on the trunks of trees which stood in its course. The upper part of the bog subsided from 10 to 15 feet; its margins were much rent with fissures.¹

A.D. 1895, August 9.—*Bog near Dungiven, Co. Derry.*—The site was in the townland of Briskey, at the east slope of Benbradagh; an extensive mountain bog 10 to 30 feet in depth, sloping at a gradient of about 1 in 12. Where the burst occurred a small stream runs underground for about a quarter mile, the ground above it being firm, so that cattle grazed on it. On the evening of August 9th there was a thunderstorm, but not accompanied by any excessive rainfall. The weather during the summer had been normal. In the night, probably before midnight, between 2 and 3 acres of bog gave way. For some 40 yards length at its lower end, the bog burst out entirely. Over the rest a tapering area 300 feet wide by 600 long, the ground subsided about 10 feet, leaving great blocks of the solid crust, broken up in a fantastic way. A very considerable flood of water and peat poured down the stream, which eventually joins the River Roe. No damage was done, as the gradients are steep, and the land not under cultivation, but a cottage situated beside the stream 1 mile below the scene of the outburst narrowly escaped being washed away. A deposit of peat was left on the banks of the stream for a considerable distance. There is evidence of several similar slides having taken place in the district.*

Outside Ireland the bursting of bogs appears to be a phenomenon of great rarity. Klinge, in a valuable Paper on bog eruptions, states that, after a diligent search through European literature, he has been able to discover only two examples that

¹ Report to the Board of Public Works, by Mr. A. T. Pentland, 24th November, 1890.

* Information supplied by Mr. H. C. Moore, C.E., Dungiven.

did not occur in this country. To these we are not able to add more than two others. The occurrences are as follows:—

A.D. 1763, Autumn. Stuckhauser bogs, Treuenfeld, Duchy of Oldenburg.¹

A.D. 1772, December 16. Solway Moss, Cumberland, England.²

A.D. 1871, November 29. Stanley, Falkland Isles, off Cape Horn.³

A.D. 1886, June 2. Stanley, Falkland Isles.⁴

The recorded outflows in Ireland and elsewhere differ partly in magnitude, but chiefly in the rapidity of flow of the escaping material. The rate of flow is evidently a function of the slope of the ground and the viscosity of the fluid, and the latter depends on the ratio between the amount of water and of solid contents present in the moving material. A difference also exists in the proportion of solid crust to liquid contents. The largest proportion of solid material is met with in the flow of 1745. In this case the bog shifted bodily, and the movement might, with more justice than in most instances, be compared to that of a landslip. The late eruption of Knocknageeha was one of the largest on record, and is also characterised by the unusually large proportion of water present in the liberated material. Hence its rapid flow.

Klinge,⁵ the latest investigator of these phenomena, expresses views on the constitution of peat bogs differing in some respects from those usually accepted. He labours to prove that the absorption of sub-aerial water, or the development of large quantities of gas, are insufficient to account for the bursting of bogs. He regards mountain bogs as of two different kinds, those which have grown in the uniform climate of the western coast of Europe, characterised by a continual increase in the degree of decomposition from their surface downwards, and those which have arisen under the

¹ Lesquereux, Untersuchungen über Torfmoor: German edition by Lengerke, with remarks by Sprengel and Lasius, 1847, p. 165, Anmerk.

² Lyell: Principles of Geology.

³ Extracts from a letter by Acting Governor Bailey to Governor Callaghan. *Quarterly Journal of the Geological Society*, vol. xxxv., Proceedings, pp. 96, 97, 1879.

⁴ Extracted from a letter by Lieut. Governor of the Falkland Islands, Arthur Barkly, to the Rt. Hon. Earl Granville. *Quarterly Journal of the Geological Society*, vol. xliii., Proceedings, p. 2, 1887.

⁵ Ueber Moorausbrüche, *Botanische Jahrbücher*, Bd. xiv., 1892, p. 426.

influence of severe changes of climate ; the latter consist of alternating layers more or less highly decomposed. The different layers have different saturation-limits for water, and these limits once attained never alter. There is no vertical movement of water through a bog. This view, the author asserts, stands in complete opposition to statements made by older writers as to the absorption by bogs of from 50 to 90 per cent. of their bulk of water. In support of his contention that peat bogs are impermeable, he appeals to pools on their surface, often 5 to 10 feet in depth, separated by peat-walls only 3 to 5 feet thick, and yet with water-levels differing from each other by several feet. The dome-like form of mountain bogs he regards as inexplicable, unless a high capacity for water in conjunction with imperviousness be admitted for the peat. Excessive rainfall accumulates in pools on bogs, which are drained by surface channels. Pools only occur on bogs near the wet western coast of Europe. The author makes an interesting observation on the dessicating effects of sphagnum on the air over mountain bogs. This is so great that on the leeward of these bogs, at least in Norway and Nova Zembla, an aero-xerophytic (dry air) flora occurs.

The immediate cause of an eruption of a bog is, according to Klinge, the violent irruption of water into the bog from below.

In discussing Klinge's views we may first point out that the mountain bogs of this country belong to his first class—those in which the decomposition of the vegetable matter increases from the surface downwards. The decomposed peat is heavier than water, and tends to accumulate at the bottom : the crust on which the growing plants are found is lighter than water, and floats on the top of the bog. It is between the crust and the lower layers that we should expect the most fluid portion of the bog to occur.

We cannot agree that the crust is impermeable ; the fact that bogs can be drained is opposed to such a view ; nor do the pools which Klinge instances afford conclusive proof in its favour ; they may be explained by a difference in permeability of the surrounding peat, and that they are being drained of water, or have been supplied with it, it is possible, at different rates.

We see no reason to doubt the correctness of the accepted view, which regards a peat bog as consisting of a fluid interior, more or less viscous, and an outer felted crust. The closing up of drains and canals, cut into bogs, is a familiar phenomenon which supports this view.

Although the felted envelope of a bog is close enough at its margins to afford support to the fluid interior, it is often broken by holes in the middle; into these the soft, black fluid of the interior oozes up, as everyone who has traversed a wet bog is well aware. Through such openings rain-water may make its way, and join the liquid accumulation below the crust.

All mountain bogs present very similar features; and the fact which appears most wonderful is not that they burst, but that they do not do so more frequently.

Evidently the crust, in its natural state, is, as a rule, equal to the task which the contained water puts upon it, and it is only when weakened by unusually deep cuttings that it gives away.

If this cause be considered sufficient, it might be thought unnecessary to discuss the question further, yet we think that the eruption of the water from below, as Klinge suggests, though not as he postulates sudden and violent, may sometimes, perhaps frequently, have played a chief part; that, indeed, not a decrease in the support afforded by the crust, but an increase in the pressure of the contained fluid may have been the last in a train of causes which brought about the catastrophe. In the present instance the whole structure of the country (fig. 4) would lead the geologist to suspect the existence of springs: the southward dip of the beds forming the rising land to the northward of the bog, would convey subterranean water towards it from a large catchment basin; the fault underlying the bog would serve as a conduit, through which this water would rise beneath it. The water draining away from such a spring would give rise to the wet line in the bog. The existence of such a spring would also afford an explanation of the origin of the bog; about the waters escaping from it, bog plants would naturally spring up, and would thence spread outwards and upwards; but since their growth would commence near the spring, it is there that

we should expect to find the bog attaining its greatest height above the level of the surrounding country.

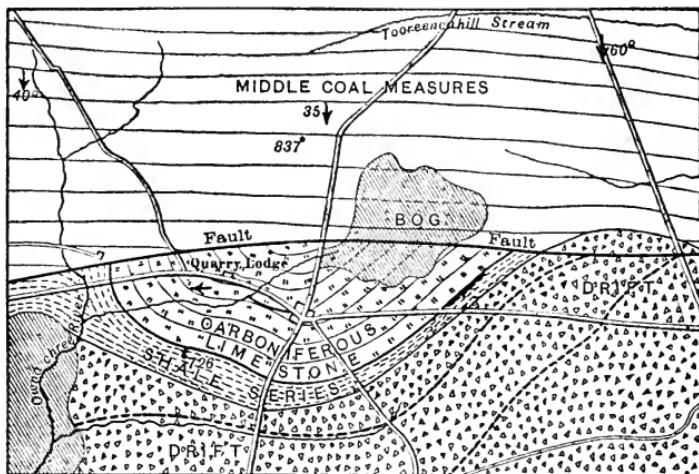


Fig. 4.—Geological Map, founded on that of the Geological Survey, showing the fault which underlies the sunken portion of the bog. Scale 1 inch to a mile.

In view of the probability that much of the water discharged from the bog had its origin in springs, the occurrence of an earthquake about ten days before the disaster should not be overlooked. The earthquake was felt from Kew, in Surrey, to as far west probably as Miltown-Malbay ; its epicentre seems to have been situated near Hereford ; and we might fairly expect that the disturbance which produced it should have continued along the great structural features trending east-to-west, which extend from Wales through the south of Ireland. Any change in the distribution of material along the fault, that we have several times mentioned as passing beneath the scene of the late eruption, would be likely to affect the subterranean drainage. The two views, one that looks for the cause of the outbreak in heavy rain, and the other which invokes the action of springs, and perhaps of earthquakes, are not mutually exclusive ; both causes may have acted together, or sometimes one, and sometimes the other. Some outbursts, however, almost certainly owed their origin to the influx of subterranean water, *e.g.*, that of Randsstown (September 17th, 1835), when the bog swelled up till its

convexity was 30 feet in height, and after sinking, was again raised in the course of a few days.

Although a great work was accomplished by the Commission on Bogs at the beginning of the present century, little has been done since ; a few organized attempts have been made from time to time to turn some of our peat bogs to better use, but the want of success which has generally attended them seems to have discouraged further effort, and thus a possible source of vast national wealth has been left to undeserved neglect.

On the Continent it is far otherwise ; there the investigation of peat bogs receives the attention that the importance of the subject demands. So great is the interest taken in the subject in Germany, that a society numbering more than 600 members exists there, having for its object the advancement of knowledge of peat culture, under which term more is comprised by German workers than might be supposed. This society publishes " *Mittheilungen*" fortnightly ; those for 1896 make a volume of 476 pages in royal octavo. A similar society exists in Sweden : it was founded in 1885, and now numbers over 3300 members. It possesses experimental peat farms, where investigations are made on methods of cultivation ; it employs a skilled agricultural engineer, who is occupied, travelling through the country, in giving information and advice to the peat farmers. A botanist is kept at work on the microscopical examination of peat, and a chemist to perform analyses. A " *Tidskrift*" is published bi-monthly ; the collected numbers for 1896 include 304 pages of letterpress. By means of this journal, yearly meetings, discussions, lectures, and exhibitions, the Society is earnestly engaged in diffusing information on all subjects connected with peat industry throughout the kingdom.

A POPULAR BIRD BOOK.

Birds of our Islands. By F. A. FULCHER. 8vo, pp. 368. London: Andrew Melrose, 1897. Price, 3s. 6d.

Such books as Mr. Fulcher's have two virtues. They present natural history in an attractive guise to beginners, and they afford refreshing reading to those who already love the objects they relate to. If they are also somewhat unsafe guides, plenty of text-books exist to serve as correctives. Mr. Fulcher is fond of his subject, and his book, which is pleasantly written as well as profusely illustrated, has this claim on Irish readers, that the author has made our own island the field of a considerable proportion of his observations. He is even so good as to proffer (we may not say present) to our Avifauna a new species of Wagtail: but here, for the present, commendation comes to a halt.

Mr. Fulcher's chapter on the Wagtails is a very shaky piece of writing. It is enriched with an illustration (p. 209) said to represent the Grey Wagtail, but in which a female Pied Wagtail, or else no British species, is the bird figured. The author may not be answerable for this; but he strangely states (p. 219) that the three common British Wagtails—Pied, Grey, and Yellow—lay eggs so much alike “that, apart from their surroundings, it is impossible to distinguish between them.” One might as well say a Sedge-Warbler's egg cannot be told from a Sparrow's. Then Mr. Fulcher writes (p. 216) of “the yellow and olive of the wings, and olive-green back” of the Grey Wagtail, and says these “give no sense of greyness.” To a common eye they give no sense of greenness, the back being slaty grey, and the quill-feathers blackish. And speaking of the Yellow Wagtail, whose upper surface really is olive, he says (p. 217) “its plumage is very like that of the Grey Wagtail, yellow and green.” In truth, beyond both being yellow beneath, the plumage of the two has scarcely a common feature. Notice is drawn to these details as showing that either Mr. Fulcher has paid little attention to the Wagtails, or that his sense of colour is peculiar.

We now come to our author's new Irish Wagtail, which “has no scientific name, for strange to say, our leading ornithologists do not seem to know it.”

“I saw it on the roof of a house in the extreme north of the wild peninsular (*sic*) of Inneshowen. A little flock of five of those fairy-like birds had alighted, probably to rest after crossing the North Sea. Not green and gold, or grey and gold, or olive and gold, as times without number I am asked, but all gold, pure gold of brightest yellowest hue,

except for a tiny flash of cinnamon under the chin. No canary can compare with the golden hue of my Wagtail—golden head, golden tail, golden back, gold beneath—from breast to tip of tail pure gold" (pp. 218-19.)

Wagtails (*Motacilla Rata*) with more than their share of yellow have been seen before; but not five together. The unkind suspicion, it is to be feared, will linger, that a group of Grey Wagtails, disporting themselves in the golden sunlight, got so suffused with splendour as for once, in Mr. Fulcher's eyes, to seem 'golden' instead of "green." There is little to be said against the substitution of one imaginary tint for another.

Even after the Golden Wagtail, the full page illustration (p. 241) entitled "Merlin and its Prey," is, at first sight, calculated to startle, the prey being an adult Mallard! But in fact the falcon figured is a Peregrine. The Gannet (p. 141) is called "the whitest member of the family of Geese," and a contrast is instituted (p. 149) between this bird's plain relations and the "handsome family" to which the Cormorant belongs. Our author has evidently no suspicion that Cormorant and Gannet belong to one and the same family. There are several reasons why the Grasshopper-Warbler is hard to see, but it is imaginative writing to include among them such a one as Mr. Fulcher's (p. 71): "In the first place, the sound (of its song) is so like that of its namesake, the Grasshopper's, that it is hard to say which is which." "Once heard," Macgillivray more accurately says of the same performance, it "can never be afterwards mistaken for the sound of a grasshopper or cricket." Many other observations are made by our author with which it is difficult to agree, but with reservations on some such points as those already particularized, his book deserves praise; and the taste with which its publishers have brought it out is also strongly to be commended. Of the full-page illustrations, that of the Great Grey Shrike (p. 223) is perhaps the most life-like. Many of the wood-cuts, e.g. "Young Larks" (p. 15), "Golden Plover in summer" (p. 30), "Curlews" (p. 199), "Snipe" (p. 193), and "Little Stint" (p. 202)—are very pleasing.

C.B.M.

PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent donations include a tortoise from Mr. J. F. Darling, a Brent Goose from Dr. Hudson, an opossum from Mr. H. J. Chippendale, a monkey from Mr. L. H. Crozier, a Long-eared Owl from Mr. E. Williams, a Hussar Monkey from Capt. J. E. Cochrane, a cockatoo from Capt. Heffernan, a Herring-gull from Mr. J. Reynolds, some newts from Master, Swift Johnston, and some sticklebacks from Master Hart.

Two Barbary Wild Sheep and two Tozerburg Goats have been born in the Gardens. Six snakes, twelve Green Frogs, six toads, a female Ibex, with kid, and a Great Wallaroo have been purchased.

16,816 persons visited the Gardens during April.

DUBLIN MICROSCOPICAL CLUB.

APRIL 8.—The Club met at the house of Prof. T. JOHNSON, who exhibited a preparation of *Ascocyclus orbicularis* (I. Ag.) Magn., a brown alga, in the form of small discs, found on leaves of *Zostera* (the Sea-Grass). The observations of Miss Hensman and the exhibitor tend to show that the species, not hitherto recorded for Ireland, is regularly present on *Zostera marina*, which is itself common on the Irish coasts.

Mr. F. W. MOORE showed some diseased leaves of *Selaginella texta*. This is a rare plant, placed by Baker as a varietal form of *S. involvens*. The points of many of the shoots turned brilliant red in colour, and in some cases further growth was arrested. In other cases the shoots continued to grow, the leaves retaining their normal colour, but the branches showing a marked constriction where the red colour had appeared. Leaves in various conditions were exhibited, from which it was evident that the change in colour was due to a breaking down of the chlorophyll granules which lost their green colour, and assumed a red tint of varied intensity, according to the state in which the granule was.

Prof. G. COLE showed a section of a hauyne-trachyte from Laach, Eifel, lent by Mr. T. Ryley. The hauyne appears in considerable abundance, and is of a delicate blue colour. This comparatively restricted silicate and sulphate, rich in soda, is here characteristically accompanied by a warm brown soda-hornblende, and by some soda-augite.

Mr. M'ARDLE exhibited *Peziza (Humaria) auriflava*, Cooke, a rare fungus, which he found growing on peat and moss in an orchid pot in the cool orchid house at Glasnevin. The specimens shown agreed well with the figure of the plant in Cooke's *Micrographia*, vol. 1, part 1, plate 6,

fig. 23. The cylindrical asci containing eight echinulate spores, and the simple or forked golden yellow paraphyses formed a striking object. Dr. Cooke reports it from France. Mr. M'Ardle is not aware that it has been previously found in Ireland.

Rev. CANON RUSSELL showed some curious nodules, which, within the last few weeks, were turned up in a field adjoining a large bog at Geashill, King's Co., of which it formed a part fifty or sixty years ago. It is described in the books of Lord Digby's office as being "moory land" in the year 1856, but since then it has been from time to time under tillage—with exception, perhaps, of that part of it where the nodules were found, which has for forty years past been left to nature. So far as he can make out, the process by which such ground is reclaimed from the bog is as follows:—

The surface moss, heather, and loose spongy turf immediately underneath, is pared off to the depth of four or five feet and thrown into the bog-hole at the foot of the cutting until it is filled up. The water which is thus displaced forms a fresh hole close to the bank which is gradually retreating as the peat is dug out. Round the edge therefore of what is called "the high bog" at a much lower level a fringe of "moory pasture" is being continually formed, made up of the accumulating loose material that had been cleared off from the top. In course of time road stuff and manure are carted over the ground, and it is made ready for the first crop, which is generally one of potatoes.

In all probability, then, these nodules were formed in what were originally bog-holes now filled up by the "clearings" from the surface of the bank. Their peculiar shape may be due, partly to the action of the water many years ago, and partly to the effect of the fungoid growth, with which they are infested. So far as Canon Russell has examined them, they are chiefly made up of the stems and leaves of the rare *Sphagnum austini* closely felted together and covered by the threads of a white mycelium, which in some cases find their way into the heart of the nodule. This moss, which grows freely in the bogs about, was first discovered in the locality by the Rev. H. W. Lett, and is well represented by the form in which it appears in these tufts. The papillæ, so characteristic of the moss, along the walls of the, cells were brought well into view by the mounts which Professor Johnson kindly prepared for exhibition. They are remarkably well developed, and seem longer than Canon Russell has seen them in some specimens of the living plant.

Mr. W. F. SINCLAIR sent for exhibition two specimens of Shagreen with notes in response to Dr. Frazer's request for information on the subject (p. 79). The first was an example of white Asiatic Shagreen, such as is used in some English sword-hilts and many eastern. It was from the skin of *Trygon sephen* or some closely allied species of sting-ray. The principal sources of Asiatic Shagreen are the Trygons or sting-rays, and especially *Trygon sephen*; in which the tuberculated area is

usually large, in proportion to the total surface; and the tubercles (called in trade the "pearl") though of various sizes, are arranged so as to present a pretty regular pattern, the lesser filling up the interstices of the greater. Their vertical axis, also, is usually at a right angle to the long axis of the fish; which is important to the sword-cutler; as the hilt covered with such Shagreen gives a good "cut-and-thrust grip." The Japanese, the best artists in Shagreen usually arrange the two or three large spinal tubercles of this fish so as still further to improve the grip. *Urogyrus asperimus* furnishes a skin used for some fancy articles. It is a good-sized ray, of all the warm seas of Asia, having many large tubercles produced into sharp curved spines. It is very good for shields. In the East, the Shagreen of rays is more valued than that of the allied saw-fishes, and of sharks and dog-fish; but there is hardly any cartilaginous fish that does not furnish some here and there. The *Plectognathi*, especially *Triacanthus* and *Balistes*, furnish a little, of small size and poor quality.

All bright coloured Shagreens are dyed, and the white seems to be bleached, in the best Japanese specimens. That of English sword-hilts is blackened when the sword is finished.

Rays, amongst other merits, are much easier to skin than Sharks and Dog-fish; and, on the Indian coast, men who never fail to skin *Trygon sephen* can hardly be persuaded to do so with any other fish, unless it comes handy just when they want some Shagreen.

The exhibitor would be very glad to hear of any analysis of the "pearl" of true Shagreen. He presumes that the artificial Shagreen is not the subject of any special research at present.

The second specimen was identified by Mr. G. A. Boulenger, F.R.S., as from *Centrophorus granulosus*, a deep-sea dog-fish, widely distributed and especially abundant about Madeira. This is used for the hilts of the best English regulation swords. The comparison of this skin with that of our common species of dog-fish would probably be of some interest to amateurs. It is clearly no novelty amongst professional naturalists.

DUBLIN NATURALISTS' FIELD CLUB.

APRIL 24.—The first Excursion of the season was held, the locality visited being the Sugarloaf Mountain and Calary Bog. A large party took car to the foot of the Sugarloaf and there divided into two sections. One section ascended the Sugarloaf under the guidance of Prof. Cole (the President), who supplied each member of the party with a sketch section of the Leinster Chain, and explained that the Bray and Howth Series (of Cambrian or pre-Cambrian age) was composed of shales and sandstones, which were uplifted and hardened, the sandstones being cemented by silica to form quartzites. The Ordovician shales

were laid down in a sea upon this older series, and were in turn upheaved along the line of the Leinster Chain, in Silurian, or more probably, Lower Devonian times. The granite intruded into the great arch of strata thus produced during the progress of the movement. Subsequently, on the worn-down edges of this ridge, the Carboniferous Limestone was laid down, in a still later sea.

The other section went on by car to the Calary Bog for field work. Both sections met later and drove through the Glen of the Downs, where Dr. E. J. M'Weney found a fine specimen of *Peziza reticulata*, Grev.—a fungus hitherto unrecorded for Ireland—on a mossy bank. The party then returned to Bray.

Dr. C. J. Patten and Messrs. Connellan and Knox were elected members of the Club.

MAY 15.—A large party of members and their friends visited Powerscourt, and through the kindness of Lord Powerscourt, K.P., were enabled to visit various parts of the demesne to examine and to collect different objects of natural history interest. One section had the advantage of ascending Douce Mountain (which proved somewhat barren), under the guidance of Mr. Anton, the keeper of the deer park. All were loud in their praise of the beauty of the waterfall and surrounding parts, not a little of the beauty of the Park being due to the many fine conifers, oak, beech, and other trees.

Mr. Palmer up Douce, Mr. Knox in the demesne, and their parties saw many interesting birds, including Redstarts, Crossbills, Siskins, Stock-Dove, Ring Ousel, and a Sparrow-Hawk's nest. The Redstarts and Crossbills were evidently nesting, but could not be located. It is pleasing to be able to record the steady annual increase of the Stock-Dove and Blackcap warbler, several pair of which breed every year in Powerscourt.

Mr. Greenwood Pim noticed *Vibrissa truncorum*, a curious subaquatic fungus allied to *Peziza*, which has occurred for several years on dead branches in a stream not far from the fall. Another fungus of the same group, but much commoner—*Mitrula paludosa*—was also collected. The Bird's-nest Orchid (*Neottia Nidus-avis*) was noticed near Powerscourt House, and *Corydalis clavicularis* on the rocks near the Waterfall.

Mr. Bullock collected a number of beetles on Douce Mountain:—*Calathus piceus*, *C. melanocephalus* v. *nubigena*, *Patrobus assimilis*, *Pierostichus vitreus*, *Nebria Gyllenhalii*, *Bradycellus distinctus*, *B. cognatus*, *Philonthus decorus*, *Tachinus elongatus* (a specimen of this rare beetle was also found at Powerscourt), *Byrrhus fasciatus*; and at Powerscourt—*Cicindela campestris* and *Anchomenus junceus*.

Liverworts were well looked after by Mr. M'Ardle, who found *Cephalozia curvifolia* (a very pretty plant in fruit), *Jungermannia incisa*, Schrad., *J. ventricosa*, Dicks., *Scapania undulata*, L. Dum., *S. aquiloba*, Schw., *Nardia emarginata*, Ehrht., and *N. scalaris*, Sch.

CORK NATURALISTS' FIELD CLUB.

MARCH 2.—MR. R. A. PHILLIPS delivered a lecture in the Library of the School of Art on "Collecting, Preserving, and Identifying Plants." The President (Mr. W. H. SHAW, M.E., J.P.), occupied the chair, and there was a good attendance of members. Mr. Phillips described at length the various ways of drying and mounting plants, illustrating his remarks by an exhibition of specimens, and impressed on his audience the necessity for taking full and accurate observations with regard to plants which they would be collecting, as without such records specimens are, from a scientific point of view, useless. He also dwelt on the pleasure to be derived from the possession of an herbarium which, on looking over, brings back to the collector's mind many pleasant recollections of his journeys in search of specimens.

MARCH 9.—MR. R. A. PHILLIPS lectured on "Rare and Characteristic Plants of Co. Cork." The chair was occupied by the President (Mr. W. H. SHAW, M.E., J.P.), and there was a large attendance. The lecturer first dealt with the importance of studying the topographical and geographical distribution of plants as a means of obtaining a knowledge of the past history of species and of throwing some light on the geological problems of the present day. He then described the features of the flora of Cork as contrasted with that of other parts of the British Isles, illustrating his remarks with specimens of flowering plants and cryptogams, selected from his herbarium, which were arranged in groups under Watson's "types" of distribution—Hibernian, Atlantic, Germanic, English, Highland, &c.—indicating briefly the geographical range and other peculiarities of each species. The lecture was much appreciated, many of the audience taking notes, and it is hoped will have the effect of arousing among members an interest in the flora of one of the richest botanical districts in the British Isles.

APRIL 13.—The Fifth Annual General Meeting was held in the Library of the School of Art, Mr. DENHAM FRANLIN, J.P., in the chair.

The minutes of the previous meeting having been read and signed, Mr. COPEMAN (Hon. Sec. and Treas.) read the annual report, of which the following is an abstract:—

The Committee are pleased to report a steady increase during the past year to the ranks, the membership now standing at 58 as against 52 for the previous year, which, with five honorary members, makes a total of 63. Four members have resigned during the year, and ten new members have joined, making the nett gain six. The following ten excursions were made during the year, one only being interfered with by bad weather. MAY 2.—Fota, attended by over fifty members and friends. MAY 30.—Douglas, Ballyphehane Bog, and Vernonmount. JUNE 10.—

Ballincollig and the Lee Valley. JULY 1.—Carrigaline and Rennie's Point, a whole day drive attended by fourteen. JULY 11.—Waterford to Ballincollig. JULY 25.—Voughal, a useful afternoon spent in and around the marshes. AUGUST 12.—Whole day, visiting Rostellan Castle, the grounds of Castlemary and the village, and Round Tower of Cloyne. AUGUST 22.—Watersfall and Ballinhassig Glen. SEPTEMBER 5.—Blarney and St. Anne's Hill. The winter meetings were—DECEMBER 10.—A lecture by Mr. G. H. Carpenter on "Irish Animals, past and present," delivered in the Ball Room, Imperial Hotel, to a crowded audience. FEBRUARY 14.—Mr. R. Lloyd Praeger gave a very interesting account of Bogs and Bog-bursts, with special reference to the recent Kerry disaster, a subject of special and painful interest, which drew a large number. MARCH 2 and 9.—Mr. R. A. Phillips gave two useful and interesting lectures on "Collecting, Preserving, and Identifying Plants" and "Rare and Characteristic Plants of Co. Cork." The Committee did not see their way this year to hold a Conversazione, but hope that one may take place before the next General Meeting. No large joint excursion is fixed for the coming summer, but members will be invited to join the Dublin and Belfast Clubs in a three days visit to Ballycastle, Co. Antrim, while in August we hope in conjunction with the Dublin and Limerick Clubs to visit the scene of the bog-slide in Kerry. The Committee would urge upon members the desirability of more systematic study in the various branches of Natural History; we have lying at our very doors in the Counties Cork and Kerry rich fields for the naturalist in which there is always the incentive to new discoveries, as illustration of which take the following finds by our indefatigable worker Mr. R. A. Phillips—*Ranunculus tripartitus* found near Baltimore in April, 1896, an addition to the flora of Ireland, while the following species, mostly found on Sherkin and Cape Clear Islands and the Schull promontory last August, are additions to the Cork flora—*Fumaria muralis*, *Helianthemum Breweri*, *Ornithopus perpusillus*, *Rubus macrophyllus*, *R. fissus*, *Galium uliginosum*, *Crepis biennis*, *Mentha gentilis*, *Lamium intermedium*, *Sparganium affine*, *Carex acuta*, and *Triticum pungens*.

To these may be added *Cochlearia anglica* and *Geranium pusillum* which, though recorded by the earlier botanists, have been rejected by recent writers. Both were found in the neighbourhood of Cork Harbour. The Balance Sheet is very satisfactory and shows a sum of £14 to the credit of the Club, the Committee think that this money should be expended in furthering the objects of the Club, and therefore make the following suggestions:—1st. That juniors (age under 20) be allowed to enter by paying a subscription of 2s. 6d. 2nd. That a prize scheme be formulated to try and create an interest in botany, entomology, and other branches. 3rd. That the nucleus of a reference library be made, the books to be available to any member under properly formulated rules. The Secretary, who has held office from the inception of the Club, is resigning owing to want of time properly to look after its interests.

The adoption of the Report and Balance Sheet was moved by Mr. J. L. COPEMAN, seconded by Mr. E. B. HUGHES, and passed unanimously. The following office-bearers for 1897-8 were then elected—President, W. H. Shaw, M.E., J.P.; Vice-Presidents, Prof. M. Hartog, D.Sc., F.L.S.; T. Farrington, M.A.; Miss H. A. Martin, M.R.C.P.; J. H. Bennett, John Gilbert, and J. L. Copeman; Secretary and Treasurer, E. Brooke Hughes; Curator, R. A. Phillips; Committee, Mrs. E. B. Hughes, Mrs. T. Russell, F. R. Rohu, H. Lund, J. Noonan.

It was decided to hold the first summer out-door meeting at Fota on May 8th. A discussion then followed relative to other places suitable for excursions.

On the motion of Mr. R. A. PHILLIPS, seconded by Mr. E. B. HUGHES, a hearty vote of thanks was passed to Mr. Copeman for the able and efficient manner in which he had at all times during his five years of secretaryship advanced the interests of the Club.

N O T E S.

ZOOLOGY.

INSECTS.

Entomological Notes from Poyntzpass.

The excessive wetness of the spring has made insect life very scarce. On the few warm fine days that we had in April some *Bombus terrestris* appeared and a few *Aphodius prodromus* and *A. fimetarius*. *Vanessa urticae* was as usual the first butterfly to appear, but I did not see it out of doors till April 18th, *Pieris napi* appearing on April 26th. I have seen a few *Andrena cineraria* and *A. albicans*; while a solitary *Nomada* which is probably *borealis* was captured crawling on the ground. A few *Vespa vulgaris* have appeared but all were dull and sluggish, the earliest was noted on March 9th, and *Apis mellifica* was seen on the wing on March 16th. Beetles have not been more plentiful than other insects. In a boggy drain I got *Hydroporus umbrosus*, *H. obscurus*, *H. nigrata* and *Aqabus unguicularis*. In moss I took *Homalota graminicola*, *Staphylinus erythropterus*, *Quedius rufipes*, *Lathrobium fulvipenne*, *Stenus tarsalis*, *Trichopteryx lata*, *Ptenidium evanescens*, *Halyrea xviii-guttata*, *Barynotus marenensis*, &c. In haystack refuse among other things I met with *Homalota sordida*, Marsh, *Ephistemus gyrrinoides*, *Typhaea fumata*, and *Cononimus norifer*. I was disappointed at not meeting with better things, as haystack refuse is usually rather prolific. *Geotrupes* is not as much in evidence this spring as last, though I have heard his "drowsy hum" occasionally and one sunshiny day

caught a specimen which I thought at first was *G. sylvaticus* but which seems to be only a small *G. stercorarius*, L. Moths have been positively rare. I got nothing at all at sallows, but a nice *Xylocampa lithorrhiza* was obliging enough to settle on my bedroom window from whence it was soon transferred to my setting board, and on the same day I captured a *Depressaria* whose name I am not sure of. Since then (April 10) my net has not been of any use. However, I shall later on have more use for it.

W. F. JOHNSON.

BIRDS.

Spring Migrants at Poyntzpass.

The exceeding lateness of the season has made the arrival of the migratory birds very irregular, and though most have put in an appearance they can hardly be said to be properly arrived even yet. The Chiff-chaff arrived on April 6th, and the Willow-Wren on the 10th. These two are to be heard and seen frequently, but the Swallow, which I observed first on April 18th, has only shown itself in small numbers. I do not think I have seen more than three at a time as yet. The Cuckoo was reported to me on April 22nd, but I did not hear it myself till the 26th; the Corn-crake was heard some six miles from this on the 23rd, but here not till the 25th, but the cold of the past week seems to have driven them back again.

I saw a single Swift on May 4th, but none since.

W. F. JOHNSON.

MAMMALS.

Irish Bats.

The record of another county for the Lesser Horse-shoe Bat (*R. hipposideros*) will be found in the *Zoologist* for 1887 (page 92), namely, Muckross, Co. Kerry. Mr. J. Ray Hardy, of the Manchester Museum, found a large colony in the Abbey stables, and names also the parasite found on them, *Nycteribia biarticulata*.

English students of Mammalia await with interest a decision concerning the occurrence of the Noctule in Ireland.

J. E. KELSALL.

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SOME OBSERVATIONS BY ENGLISH NATURALISTS
ON THE FAUNA OF RATHLIN ISLAND, AND
BALLYCASTLE DISTRICT.

I.—GENERAL, OBSERVATIONS.

BY R. STANDEN.

THE exceeding richness of the field for study of various departments of Natural History, afforded by Ballycastle and surrounding district, induced Dr. G. W. Chaster, of Southport, Mr. J. Ray Hardy, of Manchester, and myself, to avail ourselves of an opportunity of re-visiting a place which our experience of last year had proved to be well worthy of further investigation. Accordingly, the 18th of May found us again comfortably installed in our quarters at the Antrim Arms Hotel, with a valuable addition to our working force in the person of Mr. Lionel E. Adams (Hon. Treasurer of the Conchological Society of Great Britain and Ireland), an enthusiastic naturalist, and well-known conchologist, who had been induced to accompany us. Later in the week we were joined by Mr. R. J. Welch, and Mr. W. Welch, of Belfast.

Our stay lasted exactly a week, and it is hardly possible to imagine a pleasanter time, or a busier one. I cannot refrain from alluding to the kindness and indulgence shown by our host and hostess, Mr. and Mrs. Hunter, to "hunters" who cumbered the place with all sorts of extraordinary objects! It often happens when a party of naturalists engage in a campaign that each one sticks to his own speciality, without trying to help the others, but we, on this occasion, did not confine ourselves to the *mollusca*, though this was, primarily, our chief object; on the contrary, we severally went in for anything that came to hand at the time, and so not only learnt a great deal of each other's subjects, but immensely increased the various records and observations.

Most of the scenes of our last year's researches were again visited, including Fairhead, Murlough, and Whitepark—where we devoted a long day to the exploration of one of the famous "middens," working hard with spade and sieve, and obtained a large number of nice worked flints (scrapers, arrowheads,

and the like), along with numerous fragments of pottery, which fully repaid us for our toil. We also extended our investigations to Glenshesk, Armoy, Glendun, Cushendun, and Rathlin Island. The day on Rathlin will not readily be forgotten by any member of the party, and general regret was expressed that we could not devote a full week to its exploration alone—the scenery, birds, insects, and plants all combining to make it a veritable paradise for any true lover of nature. The long row home in the evening, over a perfectly calm sea, enlivened by the gambols of a school of porpoises, with a glorious sunset lighting up the rugged coast-line, was something to be remembered. At Cushendun we were joined by the Rev. S. A. Brenan, of Knocknacarry, who received us most kindly and hospitably, and pointed out many of the more interesting features of the neighbourhood, together with the localities for several choice objects. He also gave us some valuable notes on the birds and wild animals of the district, and showed us his collection of local birds, birds' eggs, and pre-historic implements. Amongst the animals observed by Mr. Brenan may be noted—in addition to our own observations—the Fox (rare), Pine Marten, Brown Rat (very abundant), and Hedgehog. Colgan, our driver, also gave us some interesting details respecting the wild animals of the district. The Otter and Badger were common, he said, and we saw some stuffed specimens of the latter, captured in the district, where it has the reputation of causing much destruction amongst the young lambs. We saw the Stoat near the old ruined church at Ballycastle, and in the woods alongside the railway, not far from the town, large numbers of gnawed hazel-nuts indicated the presence of numerous mice. On the banks of the Margy—a pretty little river, abounding with trout, which falls into the sea at Ballycastle—we observed at dusk numerous bats, which, as far as could be judged from their flight, were the Lesser Horse-shoe, Long-eared, and Pipistrelle. From the resting-places of the Long-eared Owl in the pine-woods at Glenshesk and other places, a large number of Owls' "pellets" were collected. These "pellets," which consist of masses of the fur, feathers, and bones of small animals and birds felted together, are disgorged by the Owl after digestion of its prey, and there is no

better method of attaining a correct knowledge of the smaller mammalia inhabiting a given locality, than is afforded by a careful examination of the bones and skulls they contain. The skulls are generally in a fairly perfect condition, and are always easily identifiable by a competent osteologist. All the "pellets" we collected have been minutely examined by Mr. Lionel E. Adams. They numbered 225, and the following is his analysis of the species represented in them:—Lesser Shrew, 10; Brown Rat, 22; House Mouse, 5; Long-tailed Field Mouse, 357; Bats, 3; Blackbirds or Thrushes, 5; Sparrows, 7; other small birds, 21. In 6 pellets were the remains of a beetle (*Geotrupes stercorarius*). The district is a good one for birds, and the excessive tameness of many kinds was a striking and notable feature. This may, perhaps, be accounted for from their not being persecuted by boys to the same extent as in England. Enquiries from boys we met as to whether they knew of any nests, invariably elicited the remark, "We don't mind them." The nests of the Magpie were very numerous, and formed a conspicuous feature of the landscape. They were usually placed in quite low trees close by the cottages, and the country folk apparently never molest them, perhaps from a superstitious motive. A Cuckoo calmly sat on a roadside wall whilst our car drove past within a few feet of it; Thrushes and other small birds did the same. A Blackbird sitting on its nest allowed me to stroke its back, without showing the least alarm, and I had my hand within a foot of a Long-eared Owl, perched in a low fir-tree, before it deigned to flutter off into an adjoining bush. Many species were observed breeding. The Sparrow-hawk, Kestrel, and Long-eared Owl were common, and we came across several pairs of the latter nesting in the pine woods. We were informed that the Peregrine was nesting on Tor Head, and saw one of these splendid falcons fly from that direction and glide along the rocks at Murlough, where it swooped down upon and carried off a young Rook from a low tree. The Grey Crow and Jackdaw were plentiful. We found the well-hidden nest of the Wheatear under a heap of stones on Rathlin, and the Stonechat, Whinchat, Rock-Pipit, Twite, and Reed-Bunting, were all plentiful. The Chiffchaff and many other warblers abound. We found the beautiful nest of the Gold-

crest at Glenshesk, and a nest of the Wild Duck on Fairhead. Several pairs of Oyster-catchers and Ringed Plovers had nests at Whitepark and Murlough. Rev. S. A. Brenan has observed the following less common species nesting about Cushendun :—Barn Owl, Pied Flycatcher, Dipper, Ring-Ouzel, Grasshopper Warbler, Grey Wagtail, Bullfinch, Nightjar, Heron, and Rock Dove—which nests in the “Pigeon Cave”—but we did not meet with any of these. The sea-birds on Rathlin are well worth a special visit, but I have not the space to devote to their adequate description, especially as that has already been well done elsewhere.

The date of our visit was somewhat early for any but the usual spring species of butterflies, but, judging from the number of larvæ met with, there appears every likelihood of the district proving a prolific hunting-ground for Lepidoptera later on in the season. *Euchloe cardamines* was especially abundant in the wood adjoining the railway, and a fine series of both sexes was obtained, just emerged from the chrysalis, and in the choicest condition, flying in the “rides” cut through the wood, in company with *Pararge aegeria*, and *Pieris rapæ*; whilst *Pieris brassicæ*, *Vanessa urticae*, and *Chrysophanus phœnas* were fairly common elsewhere, along with the above, both on the mainland, and on Rathlin. Many species of bees were observed, and captured, as well as other insects, but so far we have not had time to work through any of this material, with the exception of the coleoptera captured on Rathlin, of which Mr. Hardy has prepared a list for this paper.

Near the harbour at Ballycastle, and at Murlough, the rock-pools swarm with anemones, and many pretty varieties of corallines and seaweeds, and would prove a capital collecting ground for those specially interested in these pretty objects. A few seaweeds we brought away have been identified by Mr. Harold Murray, of the Botanical Department, Owens College. They are *Laurencia pinnatifida*, *L. cespitosa*, *Polysiphonia urceolata*, *P. Brodiæi*, *Callithamnion arbuscula*, *Enteromorpha intestinalis*, *E. linza*, *Porphyra ciliaris*, *P. laciniata*, *Gigartina mamillosa*, *Urospora speciosa*, *Nitophyllum laceratum*, *Dermocarpa prasina* (on *Laurencia*), *Cladophora rupestris*, *Himanthalia lorea*, *Lithocystis Allmanni*, and *Ceramium rubrum*.

Everywhere the wondrous profusion of Primroses evoked general admiration. At Whitepark there were acres of them, interspersed with the Purple Orchis, Wild Hyacinth, and Scentless Violet; and the shady hedge-banks were one long line of starry blossoms. The Gorse, too, was a grand sight; the dense yellow masses on the hill-sides, and the golden bars stretching across country in every direction became at times perfectly dazzling to the eye as we drove along, relieved, however, at intervals by snow-white expanses of fields of Daisies. The Hawthorn was not in bloom, but gave ample promise of ere long adding variety to the flowery landscape. About Glendun the Holly grows luxuriantly, and on one bush the unusual sight of bright coral-red berries, presumably from a late autumnal flowering, side by side with spikes of flowers springing from the same branch was specially noticeable. The Hay-scented Fern (*Nephrodium æmulum*) grows in great tufts amongst the dense Hazel thickets at Glendun, along with many other species. At Cushendun the cliffs of conglomerate are studded with tufts of *Asplenium marinum*, and near the castle the Sea-holly (*Eryngium*) grows abundantly. In several places, and particularly at Armoy, we were struck with the number of fine double-flowered *Cardamine pratensis*, the beautiful flower-spikes of which stood above the short grass, and, as seen from the car, were at first sight taken to be an orchid.

The many striking and varied geological features, as pointed out and explained by Mr. R. Welch, aroused the attention and interest of the most indifferent amongst us, and his knowledge of the archaeology and folk-lore of the district made the various places visited most interesting. Standing on the high cliffs near Rue Point, Rathlin Island, itself an outlying area of the Antrim basaltic plateau, he pointed out the main geological features of North Antrim which can be seen from that point, on the long range of rugged coast-line that stretches from the headlands of the Giant's Causeway on the west to the ancient schists of Tor Head and Crochan Point to the east. First we have the great mass of the Causeway basalts faulted down against the Cretaceous cliffs of Whitepark Bay at Port Braddan, these cliffs slipping over the soft underlying Lias clays which show on the banks of a small stream, and are well

exposed on shore after storms (see *Geol. Mag.*, Dec., 1895, and *I.N.*, 1895, p. 192). Then Sheep Head, an intrusive dolerite, with its volcanic neck, Carrick-a-Rede, carries the eye eastwards to the long range of basaltic cliffs ending at Ballycastle Harbour, and broken only by the Chalk headlands of Kenbane and Castle Head, which show at this distance merely as two white spots. The little town of Ballycastle itself lies close to the great fault, which brings up to the S.E. the old schists and gneisses about 700 feet, and also the only Carboniferous area in the county, good sections of which show on the shore and in coast cliffs to the east of town. Knocklayd, the mountain (1,695 feet) which rises to the S.E. of town, is composed of the older rocks, with a capping of Chalk and basalt. Fair Head (636 feet), a great sheet of intrusive dolerite, penetrates the Carboniferous rocks about five miles east of Ballycastle; to the south of it is Murlough Bay, where we examined, a day later, the chalk cliff resting on Trias, and slipping down over these soft beds, several hundred feet to the water edge; and the Carboniferous sandstone with marine pot-holes and the old schists on the shore at Cottage. Tor Head, and Crockan Point, the nearest points of the Irish coast to Great Britain (13 miles from the Mull of Cantyre), consisting of pre-Devonian schists and gneisses, capped at Crockan Point by Cretaceous beds which rest directly on the schists complete the panorama.

The results of our marine dredgings, off Rathlin, are dealt with by Dr. Chaster in a separate section of this paper; and, similarly, Mr. Adams gives a list of additional records in Land and Freshwater Mollusca for the whole district in general, and Rathlin Island in particular. Mr. R. Welch was eminently successful in obtaining some excellent geological and other photographs, amongst them being a series of views of the dried up bed of Lough-a-veema—the “Vanishing Lake”—which, as an illustration of “Suncracks,” and “Cañon and Plateau” in miniature, are most remarkable, and absolutely unique.

II.—LAND AND FRESHWATER MOLLUSCA OF THE
BALLYCASTLE DISTRICT.

BY LIONEL E. ADAMS, B.A.

HAVING heard such glowing accounts of the expedition to Ballycastle last September, undertaken by some members of the Conchological Society, I was very pleased when I was asked to join the same party in May of this year, as I particularly wished to study the slugs of the district.

The geology of the district has been fully dealt with elsewhere, so I will only mention, for the benefit of those who may come to the same locality in search of shells, that the whole of the district is not productive, the greater part consisting of extensive moorlands and peat bogs. The wooded glens in the valleys, and the landslips and bays on the coast, are the only spots where collecting is profitable. The distances between these spots are usually too great to work from a head-quarters by walking, and necessitate a car or a cycle. For the benefit of the cyclist I may say that the surface of the roads is good, and the gradients usually moderate.

Rathlin Island having been visited only once by a conchologist (Mr. R. Welch, who took 4 species in 1889), I give separately the list of the 34 species which we obtained from this isolated and often inaccessible spot. It must not be supposed that this list is exhaustive, as we only had a few hours on the island, and those on a very hot dry day, after a prolonged drought—which, by the way, continued to the end of our trip in spite of many and fervent prayers for rain—nor was more than a small portion of the island explored. After landing at Ushet Point, in spite of the efforts of a formidable Irish bull to repel the invading Saxons, we worked in more or less parallel lines over the hill to Ushet Lough by the crannoge, and thence along the cliffs to Church Bay, further than which we did not go.

It must be remembered, too, that throughout this paper the terms “common,” “rare,” &c., merely represent the circumstances of our particular visit, and not necessarily the average state of things.

For the sake of conformity to Mr. Standen’s previous list in this journal (January, 1897), I use the nomenclature of Dr. Scharff’s “Irish Land and Freshwater Mollusca,”

RATHLIN ISLAND.

Vitrina pellucida, Müller.—One very fine but "dead" shell was found at Church Bay. No doubt, in suitable damp mild winter weather it will prove common.

Hyallina cellaria, Müller.—This species was found to be common at Church Bay.

Hyallina Draparnaudi, Beck.—A few specimens were found with the last species.

Hyallina allaria, Müller.—Both the type and the variety *viridula* were found, chiefly at Ushet Point. R. Welch also took it in 1889.

Hyallina pura, Alder.—One specimen of the brown form was found at Ushet.

Hyallina contracta, West.—Three or four of this form occurred near Ushet Lough.

Arion ater, L.—Both the type and the var. *brunnea* (Roeb.) were plentiful.

Arion subfuscus, Drap.—Though the typical form was not observed, the beautiful brilliant orange v. *aurantiaca* (Loc.) was very abundant.

Arion hortensis, Fér.—One or two specimens at Church Bay.

Arion Intermedius, Normand.—Moderately common.

Limax maximus, L.—The var. *Ferussaci* (Moq.) was very common, though the typical form did not occur. The prevalence of this handsome form to the exclusion of the type is also noticeable on the mainland opposite. Indeed, the true type only occurred once, at Murlough, the varietal form being exceedingly common.

Limax flavus, L.—A flourishing colony of this handsome species was discovered in the little wood at Church Bay, most of the individuals being of the form *suffusa* (Roeb.)

Limax marginatus, Müller.—(= *L. arborum* Br. Ch.) This slug is extremely common on the island. Many were of the pale colour usual in N. Ireland, but the handsome var. *Bettonii* (Sord.) was equally common.

Agriolimax agrestis, L.—Was extremely common, as also the purple-coloured var. *sylvatica* (Moq.)

Amalla Sowerbyi, Fér.—Common.

Amalla gagates, Drap.—Two specimens of the dark-backed type were obtained at Ushet.

Helix rotundata, Müller.—Common and diffused. (Welch in 1889).

Helix pulchella, Müller.—Two specimens of the type were found at Ushet.

Helix hispida, Linn.—Very common and diffused. Two specimens of the var. *albida* (Jeff.) were obtained at Church Bay.

Helix virgata, Da Costa.—A colony of the nondescript form known as *sub-maritima* was found along the shore of Church Bay—no types being found; and as far as my experience goes this is the case all along the N. coast of Ulster. Welch took it in 1889.

Helix ericetorum, Müller.—The typical form and also var. *instabilis* (Zeigl.) and var. *minor* (Moq.) occurred on each side of Church Bay, but not with *H. virgata*. These two species are said never to live together in Ireland, though this is certainly far from the case in England.

Helix acuta, Müller.—In Church Bay with *H. virgata*.

Helix nemoralis, Müller.—As on the mainland opposite, the white-lipped variety was not uncommon. The following are the forms met with:—

The Type.

v. *libellula* (Risso) ooooo, (1 2 3) 4 5, (1 2 3 4 5).

v. *libellula* (Risso) and *albolabiata* (v. Mart.) ooooo. Common.

v. *rubella* (Moq.) ooooo, oo3oo.

Helix aspersa, Müller.—The rather dark form common in North Ireland was very plentiful, and two specimens of var. *tenuior* (Shuttle.) were obtained.

Cochlicopa lubrica, Müller.—Several specimens were taken which, when cleaned, presented more of a greenish tint than usual. (Welch in 1889).

Pupa cylindracea, Da Costa.—Some found near Ushet Lough.

Clausilia bidentata, Strom.—This was found abundantly round the church and neighbouring wood.

Succinea putris, L.—Many small specimens were found in a small stream flowing into Ushet Lough opposite the crannoge.

Carychium minimum, Müller.—One or two were obtained near Ushet Point.

Limnaea peregra, Müller.—Several small specimens were found in a small weedy pond near Ushet Lough.

Limnaea truncatula, Müller.—In the little stream mentioned above, some small specimens were found.

Physa fontinalis, L.—A single small specimen in Ushet Lough by the crannoge.

Ancylus fluviatilis, Müller.—The same little stream furnished many specimens; and also another little stream by the church-yard at Church Bay.

Pistidium pusillum, Gmel.—In the stream flowing into Ushet Lough among some dwarf Water-cress a few small typical specimens were found; also a few in the Lough itself.

MAINLAND.

With regard to the mainland the following notes are intended as a supplement to Mr. Standen's previous list, not as a new independent list:—

Hyalinia Draparnaudi, Beck.—Immature specimens were exceedingly plentiful at Murlough, though, as Mr. Standen found in September, adult specimens were not common—in fact our search only resulted in a few dead adults, though mature specimens ought

not to be rare in autumn and winter. Immature shells are not always easy to distinguish from *Hy. cellaria*, but the dark blue animal of *Hy. Draparnaudi*, with its equally dark footsole need never be mistaken for the other species, whose footsole is always white. It was also found to occur at Cushendun.

Hyalinia crystallina, Müller.—The *contracta* form occurred with the type at Murlough.

Hyallinia fulva, Müller.—The variety *Mortoni* (Jeff.) was found in the sand drift in Whitepark Bay.

Arion ater, L.—Very beautiful and varied forms of this slug occur in Ireland. Of all the varietal forms, *brunnea* (Roeb.) is far the commonest. At Murlough the forms *plumbea* (Roeb.) and *reticulata* (Roeb.) were also met with, and at Cushendun var. *Swammerdamii* (Kal.) was found. Besides these well-marked forms various gradations of colour impossible to separate by varietal names were plentiful. A tolerably large album might be filled with representations of the various combinations and shades of colour which this species assumes; and this method is, I fancy, the only way to preserve correctly the colours of slugs satisfactorily. Specimens of the type and of the var. *brunnea* were found at Loughaveema, 900 feet above the sea, in the midst of an extensive waste of moorland and peat bog. Young specimens of this species, of which we found plenty, were, like the English ones, all destitute of bands.

Arion subfuscus, Drap.—Though only three specimens seem to have been noticed at Murlough last September, this slug is extremely abundant all along the north coast of Antrim. In places the beautiful brilliant orange var. *aurantiaca* (Loc.) is far more common than the type. One specimen (type) was found at Loughaveema, 900 ft. above the sea, with several of the last species.

Arion hortensis, Fér.—Two pretty forms of this common species were obtained, viz., *nigra* (Moq.) in a wood near Ballycastle, and var. *subfusca* (C. Pfr.) at Murlough.

Arion circumscriptus, Johnst.—Common at all the places visited.

Arion intermedius, Normand.—This proved common everywhere.

Limax maximus, L.—Of this handsome species only one small example of the type occurred at Murlough, the var. *Férussaci* (Moq.) everywhere supplanting it.

Limax marginatus, Müller. [= *L. arborum*, Br. Ch.]—The pale watery-looking form is that usually met with in north Ireland, but var. *Bettonii* (Sord.) is commonly distributed, and in a wood at Ballycastle a beautifully dark striped tawny individual (af. ad. var. *fulva* (Norm.) was obtained.

Agriolimax agrestis, L. was in evidence everywhere, the purple var. *sylvatica* (Moq.) being also abundant.

Amalla Sowerbyi, Fér.—This appeared only on the mainland, at Cushendun, where it was common. According to Dr. Scharff's "Irish L. and F. W. Moll." it is local in Ulster.

Helix rotundata, Müller.—Besides the type, the variety *pyramidalis* (Jeff.) was met with at Murlough.

Helix arbustorum, L.—A single “dead” shell was found at White-park Bay, which is another locality for this local shell. In Murlough as before it was far from scarce, and the variety *flavescens* (Moq.) was also noted.

Helix virgata, Da Costa.—We expected to add Cushendun to the list of localities, as a stretch of grass-grown sand offered a tempting habitat, but though we did not see so much as a “dead shell,” we saw other eager conchologists, in the shape of a multitude of fowls, which were quite sufficient to exterminate even this persistent species.

Helix aspersa, Müller.—Besides the form *tenuior* (Shuttle.) mentioned in the Rathlin list, no variation was noted in this plentiful species.

Pupa cylindracea, Da Costa.—Besides the type, a small perfectly formed dwarf form occurred at Cushendun.

Clausilla bidentata, Strom.—A single specimen of the graceful var. *Everettii* (Miller), measuring 8 $\frac{3}{4}$ mm., was found at Cushendun.

Succinea putris, L.—A small specimen was found in a roadside “flax-pool” at Glendun.

Carychium minimum, Müller.—A curious malformation occurred in a specimen from Murlough. The little creature had only one eye, the left, though it was perfectly formed in other respects.

Limnæa peregra, Müller.—The peaty nature of the soil combined with the mica schist which extends over a large portion of the north of Antrim is much against freshwater shells—yet we did come upon some small decollated individuals struggling against adverse conditions in the roadside flax-pool mentioned above. In a ditch near Ballycastle also small specimens were found, one or two being of the form *succineiformis* (Shuttle.)

Limnæa truncatula, Müller.—In a little stream coming out of the cliff at Murlough. At Cushendun were found several small individuals of Jeffreys’ variety *elegans*.

Acme lineata, Drap.—The true habitat of this beautiful little species was discovered by Dr. G. W. Chaster. It is semi-subterranean in its habits, and though found occasionally in promiscuous moss-shakings, &c., it may be found plentifully *under* the moss, or even in dry weather beneath the surface of the soil. Dr. Chaster, at Murlough, going straight to what he considered a good “*Acme* ground,” in a short time laid bare a dozen living specimens—some of the beautiful var. *alba* (Jeff.) He also informs me that it particularly affects the under side of the liverwort *Marchantia*, when this grows, not on the surface of the wet rock, but on slightly damp ground with moss, &c. If the *Marchantia* comes away easily in long pieces leaving the soil underneath porous and friable, you may look for the shell on the plant and the soil beneath, but if the plant adheres closely to a wet close surface the shell is not found.

Plisidium pusillum, Gmel.—A few specimens found in a small oozing stream at Cushendun.

III.—NOTES ON THE MARINE MOLLUSCA OF RATHLIN ISLAND.

BY GEORGE W. CHASTER.

ENCOURAGED by the success of our last year's work, four of our party determined to dredge again in Church Bay, Rathlin Island, our special object being the discovery of the habitat of *Montacuta donacina*. Unfortunately we were almost entirely becalmed, and our boatman considered that there was a risk of our being carried away by the tidal current if we ventured as far to the west side of the bay as our last year's ground. Our operations were therefore confined to the middle of the bay, and thence S.E. towards Rue Point. We obtained from our several hauls a very large quantity of sand, which was passed through our sieves and afterwards through a sieve of special construction designed to avoid the necessity of throwing away the enormous quantity of sand which still contained certain small forms. Ordinary sieves of wire gauze cannot conveniently be used with a smaller mesh than $\frac{1}{8}$ -inch, as sand rapidly chokes finer gauze. Our "washer," as we styled it, served its purpose so admirably, that I will briefly describe it.

The framework consists of two rings of stout brass wire. On these a broad piece of sackcloth was sewn, whilst at the bottom was stitched a piece of corn-millers' silk bolting cloth, with 40 meshes to the inch. To the uppermost ring were fixed four cords meeting in a loop, by which was suspended the washer, which, when complete, looked like a large sieve with collapsible sides. It measured nine inches in depth, and fourteen in diameter. The washer was hung over the side of the boat from a rowlock, being half immersed in the sea and constantly rotated to and fro. It was surprising to see how quickly the sand was got rid of, leaving behind everything of value. Instead of several hundredweights we took home little more than a pint of material from our sieves and "washer."

This dredged material looked decidedly unpromising; a few living *Dentalia* and a mass of mostly broken bivalve shells being all there was to be seen. On carefully examining it at home it was found that, although we had failed to obtain even a valve of our *desideratum*, *M. donacina*, still the yield was of great interest. There were several examples of a little known species, *Neolepton obliquatum*, Monts., previously recorded as a rarity from two Mediterranean localities. This constitutes the fourth addition to the British molluscan fauna obtained from our dredgings off the Antrim coast.

The following notes on some of our finds may be of interest:—

Turbanilla pusilla, Ph. (non Jeff.)

Chemnitzia pusilla, Philippi, 1844. *En. Moll. Sic.*, II., p. 224, pl. xxviii., fig. 21.

Odostomia lactea, var. (? *paullula*) Jeff. (Br. Couch. iv., p. 164.)

Dr. Dall has kindly compared typical specimens of this species with the shells in Jeffreys' collection. He informs me that there are no specimens named "*O. lactea*, var. *paullula*," but that the examples I sent agree with Jeffreys' "*O. lactea*, var. *d.*" It is certain that Jeffreys confounded the present species with *lactea* and that his variety *paullula* is untenable. Of this species we obtained one live and several dead specimens.

Pyrgostellis interrupta, Totten. We obtained a fine series of live specimens of this species, better known by the name "*Odostomia rufa*." As the synonymy of the species has never been fully and correctly set forth, I will venture to give it. The species is the type of a very distinct group which the Marquis of Monterosato has designated *Pyrgostelis* (*Pyrgisculus* of the same author I cannot consider separable).

FORMA TYPICA.

Pyrgostelis interrupta, Totten, sp.

Turritella interrupta Totten, 1835, *Am. Journ. Sci.*, O.S., vol. xxviii., No. 2., p. 352, fig. 7.

Turritella fulvocincta, Thompson, 1840, *Ann. Mag. Nat. Hist.*, vol. v., p. 98.

Odostomia rufa, var. *fulvocincta*, Jeffreys, in all writings.

This well known form must be considered the type of the species. It has convex whorls, usually a peripheral reddish band, and sometimes less marked sub-sutural and basal bands as well. I have compared our shells with American specimens kindly sent by Dr. Dall, and can find no difference worthy of note. It is the most common form in our Church Bay dredgings.

VARIETATES.

Var. 1. **rufa**, Phil.*Melania rufa*, Philippi, 1836, En. Moll. Sic., I. p. 156, pl. ix., fig. 7.

This has flattened whorls and is of a uniform reddish colour. I find our few specimens quite similar in every way to Mediterranean types which I owe to the kindness of the Marquis of Monterosato.

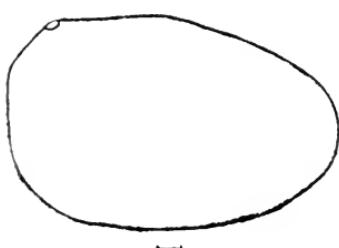
Var. 2. **crenata**, Brown.[*Pyramis crenatus*, Brown, Ill. Rec. Conch. Gt. Br. and I., 1827, pl. ix., fig. 53 (no description, figure too small to show sculpture)].*P. crenatus*, Brown, 1857, Ill., etc., 2nd Ed., p. 14, pl. ix., fig. 53.I see no reason for refusing to admit Brown's name at any rate so far as the second edition of his work is concerned. The description is far better than others which have been accepted without question, and is unmistakable. The form differs from the var. *rufa* in its "pellucid white colour" (Brown). We obtained a few live examples. Various forms intermediate between the type and the varieties were also noticed.**Liostomia clavula**, Lov. (*Odostomia clavula*).—Of this species, which in our former dredgings was found only in the dead state, one live specimen turned up this time.**Pulsellum lophotense**, Sars. (*Siphonodentalium*).—A small dead example.**Neolepton obliquatum**, Monterosato, Nuova Rivista, p. 12. This species, the most interesting of our finds, is represented by eleven valves. That shells measuring, as our larger ones do, 2·4 mm. by 1·8 mm. should have escaped observation will be surprising only to those who have not attentively studied the smaller marine Pelecypoda, amongst which the separation of immature forms from adult *minutiora* is a matter of very great difficulty. As the species has never been figured, I give a sketch of one shell (Fig. 2) and an outline of another of slightly different contour (Fig. 1). It will be found quite

FIG. 1.

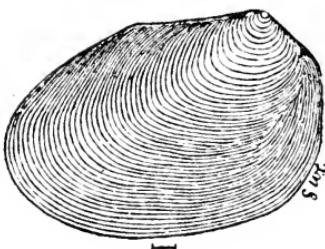


FIG. 2.

unlike any other British form. The outer surface is covered with fine and close-set concentric striæ, which are however so strong as to give the shell a rough appearance.

Its distribution is Palermo (Monterosato), Livorno (Uzielli), Eleusis, Greece (G. W. C.)

My examples from different localities differ slightly in form, but all are easily recognizable as belonging to the same species.

The following species which were obtained by us last year were inadvertently omitted from my previous list:—

Utriculus umbilicatus, Mtg.

Actæon tornatilis, L.

Venus (Clausinella) fasciata, Da Cos.

IV. THE COLEOPTERA OF RATHLIN ISLAND.

BY J. RAY HARDY.

DURING our visit to Ballycastle in May last, I devoted myself more particularly to the Coleoptera of the district, and obtained a considerable number of species, the time of year being especially favourable for their collection. The opportunity afforded of visiting Rathlin Island gave us peculiar satisfaction, each having felt a strong desire to search this isolated spot, where we were unable to land on our previous visit to Ballycastle in September, 1896. After landing on the Island, careful search was made by the whole of the party in likely situations, with the result that many specimens were obtained. The abundance of the *Curabidae* was remarkable, scarcely a stone being turned over which did not reveal some member of this interesting group.

As I believe there is no published record of the Coleoptera occurring on Rathlin, I have deemed it best to give a special list of those we obtained on the Island, which were as follows:—

Cicindela campestris, L.

Notiophilus aquaticus, L.

N. palustris, Duft.

N. rufipes, Curt.

N. biguttatus, F.

Elaphrus cupreus, Duft.

Blethisa multipunctata, L.

Cychrus rostratus, L.

Carabus granulatus, L.

C. arvensis, F.

C. catenulatus, Scop.

C. nemoralis, Müll.

C. violaceus, L.

C. clathratus, L.

Nebria brevicollis, F.

N. Gyllenhalli, Sch.

Leistus spinibarbis, F.
L. fulvibarbis, Dej.
L. ferrugineus, L.
Clivina fassor, L.
C. collaris, Hbst.
Dyschirius impunctipennis, Daws.
D. globosus, Hbst.
Dromius linearis, Ol.
Loricera pilicornis, F.
Chlaenius nigricornis, F.
Taphria nivalis, Pz.
Calathus flavipes, Fourc.
C. piceus, Marsh.
C. melanocephalus, L.
Anchomenus prasinus, Thunb.
A. albipes, F.
A. marginatus, L.
A. parumpunctatus, F.
A. viduus, Pz.
A. gracilis, Gyl.
A. fuliginosus, Pz.
Olisthopus rotundulus, Payk.
Stomis pumicatus, Pz.
Pterostichus vernalis, Gyl.
P. niger, Schal.
P. vulgaris, L.
P. nigrita, F.
P. strenuus, Pz.
P. vitreus, Dej.
P. madidus, F.
P. athiops, Pz.
Amara consularis, Duft.
A. spinipes, L.
A. acuminata, Payk.
A. plebeia, Gyl.
Harpalus proteus, Payk.

H. latus, L.
H. ruficornis, F.
H. neglectus, Dej.
Bradyccilus cognatus, Gyl.
B. harpalinus, Dej.
B. similis, Dej.
Patrobus assimilis, Chaud.
Trechus minutus, F.
Bembidium obtusum, Sturm.
B. biguttatum, F.
B. guttula, F.
B. atrocæruleum, Steph.
B. littorale, Ol.
B. lunatum, Duft.
B. flamulatum, Clair.
Choleva nigricans, Spence.
Silpha atrata, L.
S. nigrita, Cr.
S. rugosa, L.
Corymbites cupreus, F.
var. *æruginosus*.
Agriotes lineatus, L.
Elater balteatus, L.
Chrysomela Banksi, F.
C. varians, Schall.
C. staphylea, L.
Gastroidæ viridula, De G.
Adimonia suturalis, Th.
Malachius bipustulatus, F.
Hydroporus obscurus, Sturm.
Ocypus olens, Müll.
O. morio, Grav.
Quedius fuliginosus, Grav.
Q. tristis, Grav.
Q. rufipes, Grav.

ON THE FLORA OF THE SHORES OF LOUGH DERG.

BY NATHANIEL COLGAN, M.R.I.A.

WITHIN the thirty years which have elapsed since the publication of *Cybele Hibernica* marked an epoch in the history of Irish botany, great strides have been made in the exploration of our island flora. All of our mountain groups, almost all of our larger coast islands, a majority of our river-basins, and many of our larger lakes have been carefully surveyed by trained observers, so that absolutely virgin soil for the botanist must be sought in the wide midland areas which await, if they do not strongly invite, the attention of explorers. Yet it would be a mistake to assume that all the promising fields for methodical botanical work in Ireland have been exhausted. All of them, no doubt, have been skimmed from time to time by botanical epicures in quest of such strong sensation as may be found in a new record, or a first glimpse of some rare species in a known locality; but the thorough survey of not a few of such areas has been neglected, just because they lack the stimulus of complete novelty.

A typical example of such imperfectly explored, though by no means unvisited fields of inquiry is to be found in the shores of that imposing expansion of the River Shannon, which stretches for some 25 miles from Portumna in the north to Killaloe in the south. Since the late Dr. Moore made the beautiful lake botanically famous by the discovery on its north-west margin of the Willow-leaved Inula (*Inula salicina*), rarest of Irish plants, and mysteriously absent from the far richer flora of Great Britain, many a botanist, native and British, has visited Lough Derg, but none has undertaken so much as a preliminary survey of its shores. So having a week's leisure on my hands towards the end of July last it occurred to me that it might be very pleasantly spent in a botanical cruise down the lake from Portumna to Killaloe. With a shore-line of fully 90 miles in length it was obviously hopeless to aim at putting together in so short a time a complete list of even the summer plants. But, by a judicious selection of centres along both shores, the western or Galway shore, and

the eastern or Tipperary shore, one might reasonably expect to gain, at all events, a just idea of the characteristics of the flora. The following outline of each day's itinerary will show what particular sections of the lake-shore were carefully examined.

Leaving Dublin on the morning of the 24th July, Portumna at the head of the lake was reached, *via* Parsonstown, early enough in the afternoon to permit of the extreme north-western shore and a few of the smaller islands, including Church Island and the Silver Islands being examined before sunset. The second day, July 25th, was chiefly spent on the north-east shore in Tipperary. Coasting along Derry Island, Slevoir Point, and Gortmore, and making frequent landings at the most promising spots, the lake was crossed to Bonnaveen Point on the Galway side, where a further strip of the north-west shore, and a few more of its rocky islets were examined before the return to Portumna. The third day, July 26th, was a quiet one, spent on land, chiefly on the north-west shore. On the fourth day, July 27th, the northern end of the lake being fairly well examined, a move was made south by sailing-boat to my second station, Dromineer, at the mouth of the Nenagh river, on the Tipperary shore. On the way, Drominagh Point and the Bounla Islands on the Tipperary side, and the bogs round the mouth of the Woodford river on the Galway side were examined, the day's run by water amounting to fully 16 miles. On the fifth day, July 28th, an early start was made by sailing-boat from Dromineer across the lake to Farrahill Point in Galway. Here Hare Island was visited, and then running north 3 miles, still on the Galway shore, the Horse Islands were explored. Thence a run east was made to Ilaunmore, two miles in circuit and the largest of the lake islands, and having examined this a very laborious row in the teeth of a half gale took us back again to Dromineer, *via* the Corrikeens, a group of rocky islets lying midway between the Tipperary and Galway shores. The next day, July 29th, a move was made across the lake to the third station, Mount Shannon in Galway. Ryan's Point and Freagh Wood on the Tipperary side, and Cribby Island on the Galway side were touched at on the way, and in the afternoon visits were paid to Holy Island (Inishealtra), Young Island, Bushy Island, and

Inishparran Point. On the seventh day, July 30th, Killaloe was reached by rowing-boat from Mount Shannon, and on the way down the lake numerous landings were made, as at Rineacrush Point, the Lushag Rocks, Scilly Island, Bull Island, and Cormorant Island, all on the east shore and in Co. Clare. Finally, on the eighth day, July 31st, before leaving Killaloe by the mid-day train, a flying ascent was made of Glounagalliagh mountain, 1,746 feet in height, and lying two miles inland from the lake shore, and four miles north-west of Killaloe.

Altogether, some 20 islets and 12 points or promontories along the lake shores were rather carefully examined, and as a result of the week's exploration 403 species were observed, or 408 including Characeæ. Considering the large area traversed this number may seem disappointingly small; but it must be borne in mind that in only one instance were the observations pushed inland for more than a mile or carried upwards for more than 50 feet above the lake-level, that fully half of the working hours were spent on the water and were comparatively barren of results, and that the season was so far advanced that many of the plants of spring and early summer were overlooked. A comparison of my notes with the detailed reports on the Lough Erne flora by Mr. R. M. Barrington¹, and on the Lough Ree flora by Messrs. Barrington and Vowell,² seems to justify the conclusion that the Lough Derg flora if more fully investigated would prove by so much richer than that of Lough Erne as it would prove poorer than that of Lough Ree. Three weeks on Lough Erne, divided between the months of August, 1881, and June, 1882, yielded 417 species to Mr. Barrington, a fortnight on Lough Ree in June, 1885, and August, 1886, gave Messrs. Barrington and Vowell 481 species, and as the shores of all three lakes are preponderantly limestone, and the areas examined are not glaringly unequal, the floras admit of fair comparison.

Roughly speaking, the northern two-thirds of the Lough Derg shores are calcareous, the southern third non-calcareous, and the change of flora with change of rock was very strikingly shown on touching at Freagh wood when running west from

¹ On the Flora of the Shores of Lough Erne; *Proc. R.I.A.*, 1884.

² On the Flora of the Shores of Lough Ree; *Proc. R.I.A.*, 1887.

Dromineer to Mount Shannon. Five minutes on the rough grits here gave *Cotyledon Umbilicus*, *Galium saxatile*, *Pyrus Aucuparia*, *Vaccinium Myrtillus*, *Digitalis purpurea*, *Scilla nutans*, *Luzula maxima*, and *Lastraea dilatata*, not one of which had turned up in all the five days spent on the limestone farther north. And similar results had been arrived at in the hour spent on the Woodford bogs two days before when sailing down from Portumna. Here on the pure peat *Gnaphalium uliginosum*, *Senecio sylvaticus*, *Calluna vulgaris*, *Erica Tetralix*, *Rumex Acetosella*, *Juncus supinus*, and *Lomaria Spicant* immediately presented themselves when one passed from the limestone to the over-lying peat.

The most obvious characteristic of the Lough Derg flora is to be found in the great preponderance of a group of species, many of which are decidedly uncommon in various parts of Ireland. Omitting the very common plants, the chief members of this group are the following:—

CHARACTERISTIC PLANTS OF LOUGH DERG.

<i>Hypericum perforatum.</i>	<i>Eupatorium Cannabinum.</i>	<i>Erythraea Centaurium.</i>
<i>Geranium sanguineum.</i>	<i>Solidago Virg-Aurea.</i>	<i>Gentiana Amarella.</i>
<i>Rhamnus catharticus.</i>	<i>Antennaria dioica.</i>	<i>Lycopus europaeus.</i>
<i>Rubus cæsius.</i>	<i>Carlina vulgaris.</i>	<i>Teucrium Scordium.</i>
<i>Rosa spinosissima.</i>	<i>Cnicus pratensis.</i>	<i>Litorella lacustris.</i>
<i>Parnassia palustris.</i>	<i>Lysimachia vulgaris.</i>	<i>Juniperus communis.</i>
<i>Viburnum Opulus.</i>	<i>Sanctolus Valerandi.</i>	<i>Schonus nigricans.</i>
<i>Galium boreale.</i>	<i>Chlora perfoliata.</i>	<i>Selaginella selaginoides.</i>

Hardly an islet or promontory was landed on all down the lake, at least from Portumna to Mount Shannon, about which point a change of rock takes place, that this group did not present itself in full development. Some of the lonely rocky islets rising a few feet above the lake surface were positively ablaze with the coral berries of the *Viburnum*, standing out against the sober ashen green of the Juniper; the Dew-berry threw out its handsome bronzed streamers far over the naked limestone, and right in the wash of the waves the Water Germander (*Teucrium Scordium*) spread its matted roots through the shingle. However bare of novelty many of these desert islets may have been, and the uniformity of conditions was undoubtedly accompanied by a strong uniformity of

vegetation, not one of them lacked the charm of an absolutely unadulterated indigenous flora.

The water-plants of Lough Derg proved on the whole disappointing, the lake-bed being in general too rocky to favour the growth of a luxuriant aquatic flora. Those which were observed while cruising amongst the islands or which came up on the drag, which was freely used in all the likely shallows will be noticed in the following detailed remarks on the more interesting species of the lake flora. Not a single entry of any of the truly aquatic *Ranunculi* occurs in my notes of the week's work.

The whole of the eastern shore of Lough Derg belongs to the County Tipperary, and to District VII. of *Cybele Hibernica*, the western shore belongs partly to County Galway, partly to County Clare, and is all included in District VI. The district numbers are prefixed to each record in the following list, all of those marked VII. falling within the County Tipperary.

Thallictrum collinum, Wallr.—VII. Abundant in rock-clefts at Slevoir Point.

Ranunculus Lingua, Linn.—VI. Abundant by the Shannon above Portumna Bridge, Galway.

Nuphar luteum, Sm.—VI. and VII. Not infrequent on both sides of the lake.

Nymphaea alba, Linn.—VI. Much rarer than the preceding, only noticed near Portumna. Appears to be decidedly calcifuge and to prefer a peaty bottom.

Nasturtium officinale, R. Br.—VI. At Killaloe by the canal and in drains leading to the Shannon.

Senebiera didyma, Pers.—VII. By the old Castle at Dromineer.

Viola odorata, Linn.—VII. Under hedges by the Nenagh road near Dromineer, looking wild.

Arenaria trinervia, Linn.—VI. At Ballyvally near Killaloe, Clare, and—VII. At Gortmore.

Malva sylvestris, Linn.—VII. Round the old church and castle at Dromineer, obviously introduced as it usually appears to be in west Ireland.

Ceranium lucidum, Linn.—VII. Drominagh Point; apparently quite rare round Lough Derg, though usually abundant on the limestone in west Ireland.

Rhamnus catharticus, Linn.—VI. Church Island, Stony Is., Rin-maher, Horse Islands, Hare Is., Corrikeens, Cribby Is., &c., Galway; Long Is., &c., Clare.—VII. Bounla Islands, Ryan's Point, Scilly Is., &c., Tipperary; the prevailing shrub of the lake-shores and islands, occasionally becoming a small tree from 10 to 12 feet high.

Rhamnus Frangula, Linn.—VI. Abundant on Hare Is., Galway, but seen nowhere else along the lake. A rare plant in Ireland.

***Medicago falcata**, Linn.—VI. One well-grown plant by the roadside north of Killaloe, Clare, a casual.

Anthyllis Vulneraria, Linn.—VI. and VII. A limestone species, but very rare on Lough Derg; only seen at Farrahill Point, Galway, and at Dromineer, Tipperary.

Lotus pilosus, Beeke.—VI. Inishcaltra (Holy Is.) and Mount Shannon, Galway; Bull Island, Killaloe, and Glounagalliagh Mountain, Clare. Not seen on the limestone.

Rubus caesius, Linn.—VI. and VII. Abundant on all the limestone shores and islands, where other forms of *Rubus* seem very rare. The ubiquitous *R. rusticana*, with *R. leucostachys*, were the only other brambles gathered, but special attention was not given to this genus.

Poterium Sangisorba, Linn.—VII. Banks above the Nenagh road near Dromineer.

Pyrus Arria, Linn.—VI. Sparingly at Rinmaher, near Portumna, Galway, and on Long Is., Clare.

Sedum acre, Linn.—VI. Ilanmore and Cribby Is., Galway.—VII. Ryan's Point and abundant on rocks at Drominagh Point; rare in inland stations.

Myriophyllum verticillatum, Linn.—VI. Shannon Canal, Killaloe.

Genanthe crocata, Linn.—VI. Cormorant Is.; Bull Is., and Killaloe, Clare. Not seen on the limestone.

Caucalis nodosa, Scop.—VI. Roadsides near Portumna.

†**Cornus sanguinea**, Linn.—VII. One bush on Bounla Is., possibly introduced though growing among native shrubs.

Gallium boreale, Linn.—VI. and VII.—Very abundant on all the rocky islands and promontories and most luxuriant in some places, as on Hare Is., &c.

G. uliginosum, Linn.—Frequent in bogs near the mouth of the Woodford river, Galway; a rare plant in Ireland.

Gnaphalium sylvaticum, Linn.—VI. At the foot of Glounagalliagh mountain near Killaloe, Clare.

Inula salicina, Linn.—VI. On an island three miles south-west of Portumna, and again in considerable quantity on an islet 8 miles farther south. Also found on the opposite, or Tipperary, shore of the lake at Curraghmore and Brynas island by Mr. C. J. Lilly in 1895 (*Ir. Nat.*, 1896, p. 269.) These records show an interesting extension of range for this very rare plant.

Crepis blennioides, Linn.—VII. Abundant in a fallow field and in moist meadows by the Nenagh river, near Dromineer.

C. paludosa, Mœnch.—VI. By streams on Glounagalliagh mountain, Co. Clare.

Hieracium umbellatum, Linn.—Abundant on many of the islets and promontories of the lower half of the lake as (VI.) on Young's Is., Hare Is., Yellow Is., and Farrahill Point, Galway; on the Lushag rocks and Long Is., Clare, and (VII) on Scilly Is. and Ryan's Point, Tipperary.

Samolus Valerandi, Linn.—Generally supposed to prefer the sea-side, but more abundant round the shores of Lough Derg and its islands than I have ever observed it to be by the sea. Also recorded as common on Lough Ree by Messrs. Barrington and Vowell.

Gentiana Amarella, Linn.—VI. Rinmaher, Horse Islands, Bushy Is., Ilaunmore, &c., Galway.—VII. Derry Is., Slevoir Point Dromineer, &c.; abundant along the lake as far as the limestone extends.

Scrophularia aquatica, Linn.—VI. Bonaveen Point.—VII. Gortmore and Drominagh Point; abundant in the latter stations in dry rocks some feet above water mark.

Orobanche Hederæ, Duby.—VI. Round the ruined church on Church Island near Portumna.

Utricularia neglecta, Lehm. (?).—VI. and VII. A form with small bladders which came up on the drag from deep water at Rinmaher near Portumna, and at Slevoir Pt., Tipperary, Mr. A. Bennett is inclined to place here, but the absence of flowers prevents a positive identification.

Origanum vulgare, Linn.—VII. Near Dromineer and on the Corricken islets, but rare.

Teucrium Scordium, Linn.—Perhaps the most characteristic of the littoral plants of Lough Derg, appearing in profusion all along the shores of the lake and of its islands from Portumna south to Rineacrush, Co. Clare. The following are a few of the stations noted:—On the west side—Rinmaher, Stony Is., Horse Islands, Ilaunmore, Cribby Is., and Inishcaltra; on the east side—Derry Is., Slevoir Pt., Gortmore, Bounla Islands and Ryan's Pt. Not seen on the lower lake from Rineacrush to Killaloe. Also abundant on Lough Ree.

Plantago maritima, Linn.—VI. Farrahill Point, Ilaunmore and Yellow Is. The last station is 25 miles distant from the nearest sea, and appears to be the most inland hitherto recorded for the species in Ireland.

Juniperus communis, Linn.—An abundant shrub or dwarf tree on the islands and along the lake shores from Portumna to Mount Shannon, apparently ceasing with the limestone. The following are a few of the stations noted:—VI. Church Is., Rinmaher, Stony Is., Yellow Is.—VII. Gortmore, Slevoir Point, and Bounla Islands.

Elodea canadensis, Michx.—At Portumna, at Mount Shannon, and flowering in bog drains at Killaloe, but rare all along the lake and said by the boatmen to have much decreased of late years. In Lough Gill, Sligo, and in Lough Erne and Lough Ree, a marked decrease of this aggressive weed has also been observed.

Epipactis palustris, Crantz.—VI. Farrahill Point, Galway.—VII. Bounla Islands, Tipperary.

Sisyrinchium angustifolium, Mill.—VI. Frequent on boggy ground near the mouth of the Woodford river, growing amongst Ling, Rushes, *Molinia*, &c., and looking quite wild. This is the original station where the plant was first found wild in Ireland in 1845.

Narcissus biflorus, Curtis.—VI. Abundant in pastures near the round tower on Inishcaltra. The withered leaves were pointed out to me by a boatman who has known the plant to flourish here in a thoroughly wild state for many years. A few roots taken from the island produced flowers with me in Dublin towards the end of April last.

Sparganium simplex, Huds.—VI. On Iliaunmore, Galway, and near Killaloe, Clare.

Sagittaria sagittifolia, Linn.—VI. Near the harbour at Portumna, and at the mouth of the Woodford river.

Butomus umbellatus, Linn.—VI. Sparingly in bog drains by the Shannon at Killaloe—and (VII.) in the Nenagh river near Dromineer.

Potamogeton plantagineus, Du Croz.—VI. Bog drains near Portumna, Galway. Previously recorded from this station by Dr. Moore in *Cybele*.

P. lucens, Linn.—VI. and VII. Abundant and very luxuriant in many parts of the lake, often growing in water from 8 to 10 feet in depth. Its dense tangles are a favourite haunt of the Perch, and hence the plant is known locally by the name Perch-weed. Only four other Potamogetons were observed in or about the lake, i.e., *P. natans*, *P. perfoliatus*, *P. crispus*, and *P. pectinatus*, but *P. densus* has also been recorded.

Zanclella brachystemon, J. Gay.—VII. Dromineer Bay. This appears to be the prevailing form in Ireland, and is seldom found so far inland.

Carex filiformis, Linn.—VI. Near Bonnaveen Point and abundant by the Shannon near Portumna.

C. Pseudo-Cyperus, Linn.—VI. Rinnmaher, Galway.—VII. Slevoir Point and at Gortmore.

Deschampsia flexuosa, Trin.—VI. On Glounagalliagh Mountain, Co. Clare.

Sesleria caerulea, Scop.—VI.—Iliaunmore.—VII. Derry Is., Slevoir Point, &c., frequent on the limestone.

Poa nemoralis, Linn.—VI. Woods at Ballyvalley near Killaloe, Clare.

Glyceria aquatica, Sm.—VI. By the Shannon at Portumna.

Polypodium vulgare, Linn.—Remarkably luxuriant on moist grit boulders in the wood on Scilly Island, several fronds measuring 1 ft. 11 in.

Chara fragilis, Desv.—VI. Mouth of the Woodford river and by the Shannon near Killaloe.

var. **barbata**, Gant.—Drains by the Shannon at Killaloe.

C. aspera, Willd.—VII. Dromineer, Tipperary.

C. contraria, Kuetz.—Rinnmaher Point and mouth of the Woodford river.

C. tomentosa, Linn.—VI. Near the mouth of the Woodford river. Previously found in the lake near Portumna by Dr. Moore in 1845.

Tolypella glomerata, Leouh.—VI. Rinnmaher, and (VII.) Slevoir Point, Tipperary.

Of the plants recorded in this list the following seven are additions to the flora of District VII. of *Cybele Hibernica* :—
Galium uliginosum, *Gnaphalium sylvaticum*, *Sparganium simplex*, *Potamogeton lucens*, *Deschampsia flexuosa*, *Poa nemoralis* and *Glyceria aquatica*.

Messrs. H. and J. Groves have kindly examined and named for me the specimens of Characeæ gathered in the lake, and I am indebted to Mr. Arthur Bennett for assistance in identifying some three or four of the more critical Phanerogams.

PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Long-eared Owl from Mr. J. R. Lloyd, a number of freshwater fish from Mr. F. Godden, a Rabbit from Master Moloney, a Blue and Yellow Macaw from Judge Boyd, a pair of Bonnet Monkeys from Major W. Lloyd, and a Ring-tailed Coati from Mr. H. A. Murray. A hybrid calf between a Male Yak and a Chillingham Cow, and two Wolf-cubs have been born in the Gardens. A Black-buck, a Zebra, an Alligator, three Mandrills, two Grey Squirrels, and a Diamond Snake have been bought.

11,283 persons visited the Gardens in May.

DUBLIN MICROSCOPICAL CLUB.

MAY 20.—The Club met at the house of Mr. GREENWOOD PIM, who showed *Papulaspora sepedonioides*, a minute hyphomycete, for which he was indebted to a pupil of Prof. Scott. It occurred on potatoes in a cellar, and presented to the naked eye a powdery stratum of a brick-red colour. The mycelium and hyphae were extremely delicate and hard to detect, and were densely covered with the spores, which are produced in globular heads, the individual sporidia adhering with considerable persistence, and not readily separating. The nidus on which it occurred was rather dry, which possibly accounts for the great amount of spores as compared with small development of the hyphasmal portion of the plant.

Mr. G. H. CARPENTER showed *Eustochus atripennis*, one of the Mymaridae or fairy-flies, a family of excessively minute hymenoptera, whose larvæ are parasitic on the eggs of other insects. For the very beautifully mounted slide exhibited Mr. Carpenter was indebted to Mr. F. Enock, of London, who is making a special study of the family.

Prof. T. JOHNSON showed a preparation of *Streblonema minimum* (Sauvag.), an endophytic brown alga, forming tufts, 1 mm. high, on old *Fuci*. The material was collected at Dungarvan in October last, and had been worked out with the help of Miss M. C. Knowles, the species being new to Ireland.

Mr. MCARDLE exhibited fertile specimens of *Fossombronia angulosa*, Dicks., which Mr. Moore collected recently on a ditch-bank near the entrance to Dingle harbour, Co. Kerry, where it grew in great abundance. The plant is local in this country, and has only been found in the south-west. The specimen under the microscope showed a ripe capsule with spores and elaters, the spores are remarkable for their large size and alveolate reticulations.

Dr. FRAZER described interesting effects produced by handling *Primula obconica*, a Chinese plant, commonly grown in many greenhouses, the leaves and stems are furnished with translucent hairs filled with fluid, and it appears to be deleterious to certain susceptible individuals, some of whom suffer so severely as to be unable to handle the plant in any stage of its growth. The patient who brought it under Dr. Frazer's notice had twice experienced its evil effects at intervals of several months. It should be stated that these effects are well known to gardeners though not to the public generally.

Mr. ALLAN SWAN sent for exhibition *Saccharomyces membranafaciens*, a peculiar yeast which has been described by Hausen. It forms a yellowish scum on the surface of liquids in which it grows favourably, and will produce its endospores rapidly by the usual gypsum black method, but unlike most yeasts, these spores also regularly appear on the nutrient gelatine of surface-cultivations in tubes. This yeast is peculiar from the fact that it does not bring about alcoholic fermentation in solutions of the carbo-hydrates, nor has it any effect in inverting cane sugar.

The mounted cultivation was prepared for the morphological observation of the scum vegetation, and shows the unusual short sausage-shaped cells, with their tendency to spread out in a thin film of single cells, which never overlap each other. It was made from a pure gelatine received from Mr. Dærgensen, of Copenhagen, by the following method:—A thin cover glass, thoroughly cleaned, is passed through the flame of a spirit lamp, then a tiny droplet of weak sterile malt extract from a capillary glass pipette is placed on it, and inoculated with a platinum needle which also serves to spread out the liquid to a thin film, about one-quarter inch in diameter, the cover glass is then inverted on to a wet paper cell on a glass slip and placed in a damp chamber to develop; the growth is watched from day to day until the necessary stage of maturity be reached, when the cover glass is lifted off the cell and dried, after which it can be stained and mounted on a slip with a spun cell in Hg. Cl. $\frac{1000}{1}$ dilution. By this means the cells are retained in the exact position in which they grew, and the mount will keep for a long time.

DUBLIN NATURALISTS' FIELD CLUB.

JUNE 5.—Excursion to Edenderry.—Members and their friends took the 9.15 train from Broadstone to Edenderry. After visiting the several places of interest and taking lunch at Smith's Hotel, the party took car to the Cushaling bog, and under a local guide in waiting explored on foot (and sometimes in water) the bog. The Black-headed Gulls were seen in thousands, and their nests were met with about a mile into the bog. All stages between the egg in the nests and the mature bird were seen, and Mr. Greenwood Pim obtained several photographs. The Derris bog was crossed on the return journey. The Redshanks, many of which were seen, were already on wing. The Royal Fern, Bladder-worts and Sundews were in plenty, but no Butterwort, Vacciniums, or other characteristic bog plants were seen. *Empetrum nigrum* was abundant. One member explored the extensive bog entomologically. After tea, the Museum, due mainly to Mr. Murray, in the Town Hall, was visited and inspected with interest. The party returned to town after an enjoyable excursion, thanks not a little to the excellent local arrangements, which, the Secretary stated, Mr. Palmer had made.

N O T E S .

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ZOOLOGY.—
INSECTS.**Cupido minima near Ballyshannon.**

I captured a Little Blue butterfly (*Cupido minima*) at Brownhall the other day, the only one I have ever seen in Co. Donegal.

W. A. HAMILTON.

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MOLLUSCA.**Land and Freshwater Mollusca from Co. Westmeath.**

Whilst collecting Mollusca this spring in the neighbourhood of Multyfarnham, Co. Westmeath, I obtained a few specimens of *Helix arbustorum*, which has not, I believe, been yet recorded from this part of Ireland. The other shells taken, of which Dr. Scharff kindly named all about which I was uncertain, were :—

Vitrina pellucida.

Hyalinia cellaria, *H. alliaria*, *H. nitidula*, *H. pura*, *H. radiatula*, *H. nitida*, *H. crystallina*, *H. fulva*.

Helix aspersa, *H. nemoralis*, *H. hortensis*, *H. rufescens*, *H. hispida*, *H. virgata*, *H. ericetorum*, *H. rotundata*, *H. rupestris*, *H. pulchella*.

Cochlicopa lubrica, *Pupa cylindracea*, *Vertigo pygmaea*, *V. antivertigo*, *Balia perversa*, *Clausilia rugosa*, *Carychium minimum*, *Succinea elegans*, *S. putris*.

Limnaea peregra, *L. stagnalis*, *L. palustris*, *L. truncatula*.

Physa fontinalis, *Aplexia hypnororum*.

Planorbis marginatus, *P. coronatus*, *P. contortus*, *P. spirorbis*, *P. vortex*, *P. crista*, *P. albus*.

Bythinia tentaculata, *Ancylus fluviatilis*, *A. lacustris*, *Neritina fluviatilis*, *Valvata cristata*, *V. piscinalis*, *Sphaerium corneum*, *Pisidium amnicum*, *Anodonta cygnea*.

G. P. FARRAN.

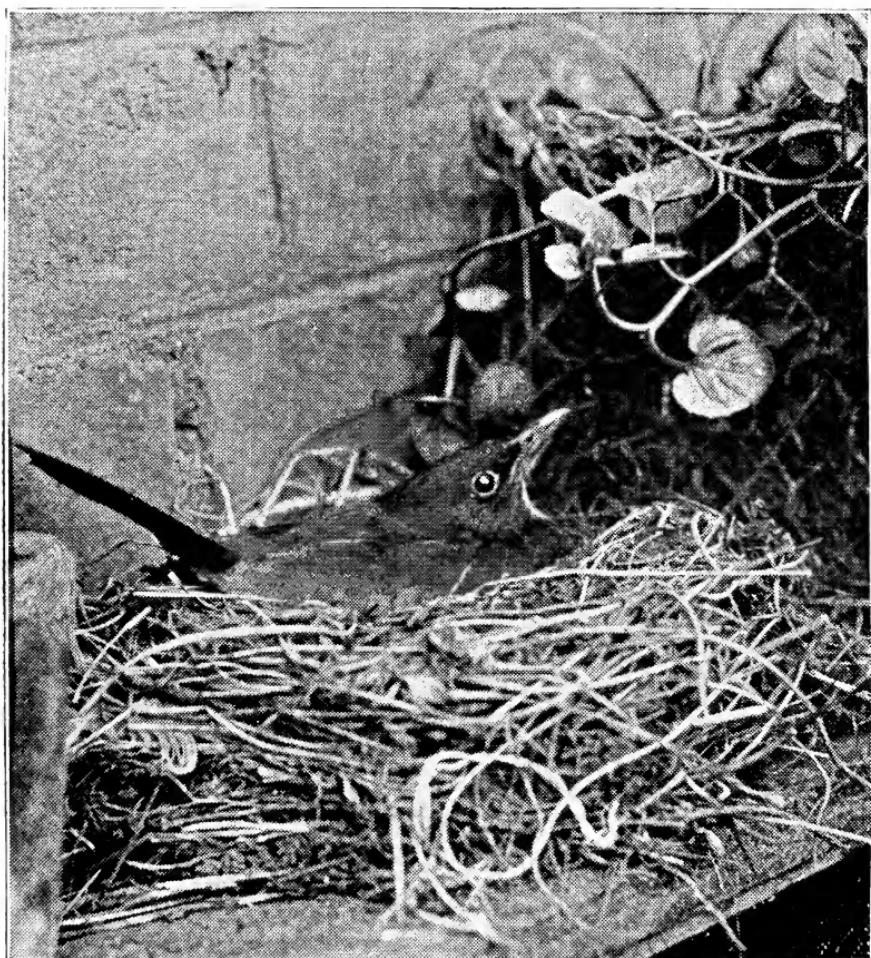
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BIRDS**White Swallow at Coleraine.**

In a back number of the *Irish Naturalist* the appearance of a White Swallow in a field near Limerick was noted. In the summer of last year I saw a similar bird being chased by other swallows at the Salmon Leap, Coleraine.

It came suddenly on the scene, was pursued by the others for a few minutes, and disappeared as suddenly. Its forked tail and white colour attracted my attention, as I had never previously seen such a bird

SAMUEL HENRY.





BLACKBIRD ON NEST IN GREENHOUSE, BELFAST.

From a photograph by Mr. R. Welch.

A BLACKBIRD'S NEST.

BY JAMES STELFOX

[Plate I.]

A BLACKBIRD has recently built her nest on a shelf against the wall of my small lean-to greenhouse in Ormeau Park, Belfast, and has, up to the end of May, laid three eggs. My gardener is working there for some time daily, and goes in and out without in the slightest degree interfering with her engagements. One day I got Mr. R. Welch to photograph her, and he succeeded in obtaining two beautiful negatives. The bird showed no signs of fear, and permitted all the manipulations of the photographer without movement, though the lens was only about three feet from the nest, and wound up by submitting to a couple of 20-second exposures with a steadiness which the accompanying plate will best indicate. The next day she was quite at home, and apparently pleased to see friends. Surely this is remarkable conduct on the part of a Blackbird.

A BOG-BURST SEVEN YEARS AFTER.

BY R. LLOYD PRAEGER, B.E.

LAST June, while enjoying the hospitality of Sir Henry Burke at Marble Hill, beyond Loughrea, I had an opportunity of examining the scene of the bog-burst that occurred in that neighbourhood in January, 1890. A report on the occurrence was made to the Board of Works by Mr. A. T. Pentland a few months after, and an abstract of that report will be found in my recent Paper on bog-bursts in this Journal (p. 157). In view of the various opinions which have been given as to the ultimate effects of the Kerry bog-burst both on the bog which gave way and on the land which was submerged, a brief account of the present state of the site of the Loughatorick slide, now that seven years have elapsed since the outbreak, may be of interest.

We visited first the scene of the outburst—an extensive stretch of undulating bog-land lying on a range of low hills at an elevation of about 600 feet. The subsided portion of the bog is long and narrow. Its appearance was in every particular similar to that of the Kerry bog, which has been described with some minuteness. There was the same saucer-shaped depression: the same rapid drop around the margin; the same abundance of "crevasses," parallel near the margin, confused nearer the centre. As in the Kerry bog, there was a flow of the whole mass along the central and lowest line, where in many spots the bog was entirely cleared away, and we walked over blocks of Carboniferous sandstone, and gravel formed of the same material. Although the bog had dried in consequence of the valley formed by the outflow, pools of water still occupied many of the crevasses. A noticeable feature was that the surface of the bog had not settled down to a smooth surface; the ridges and crevasses, hummocks of old surface and great lumps of old bog that had risen from below to fill the wider cracks, were all still in evidence. An interesting point was that the drainage of the patches of old surface, owing to the network of crevasses, has resulted in an increase in the growth of Ling and diminution of grassy plants, such as *Molinia* and *Eriophorum*, so that from afar the disturbed area is at once recognisable by its browner colour. On the bare surface left by the opening out of the crust, very little growth has taken place; the Cotton-grass, *Eriophorum angustifolium*, is pushing its rhizomes through the soft peat here and there, but most of the new surface is still quite bare. We walked down the course of the flow. In the case of the Kerry disaster, the bog burst from the face of a turf-cutting at once into a cultivated valley. Here, on the contrary, the flow followed the sinuous line of a streamlet that meanders through unreclaimed bog. The effect is just as if a gigantic plough had passed down the valley. On each side a ridge of peat, sometimes in large masses, sometimes disintegrated, has been left along the high water mark of the flood, while down in the centre the bog has been gouged out in many places to the bed-rock.

Presently signs of cultivation appeared, and we passed into a valley with a rippling stream in the centre, and cultivated

fields on either hand. Mr. Pentland states in his report that the land was covered with peat to a depth of only 12 inches ; but the cottagers assured me that in places the deposit was six feet in thickness. Be that as it may, the important point is that not a trace of the deposit now remains. It lay on the land for about two years, and was then cut, and made excellent and valuable fuel. From this precedent it would appear that the loss of land in Kerry will be only temporary, and will be compensated for by a considerable saving in the cartage of fuel, when the peat-deposit has had time to consolidate and dry.

Three miles below the scene of the outburst lies the little lake of Ballinlough, a sheet of water occupying sixty acres ; the streamlet which drains the bog enters it from the west, and flows out at the opposite side. Sir Henry Burke states that he formerly found, when fishing, depths of over fifty feet near the centre of the lake. The lake checked the flood, and has been left with its western half entirely filled up by the peaty deposit. Where there was formerly deep water, a smooth black deposit now extends. Most of this surface is quite bare of vegetation, but around the margin a coarse weedy flora has sprung up, and rendered it possible to walk over portion of the deposit. The more conspicuous plants noticed on the peat-deposit here were as follows :—*Comarum palustre*, *Spiraea Ulmaria*, *Galium palustre*, *Lythrum Salicaria*, *Senecio aquaticus*, *Pedicularis palustris*, *Rumex Acetosa*, *Salix aurita* *S. cinerea*, several Rushes (too young to name), *Eriophorum angustifolium*, *E. vaginatum*, *Carex flava*, *C. echinata*, *C. vulgaris*, *C. rostrata*, *Glyceria fluitans*, *Equisetum palustre*. A few of these were probably brought down from the bog by the flood, such as the Cotton-grasses ; but it will be noted that most of them are marsh plants which have spread to the bog-deposit from the adjoining swampy shores of the lake.

The only permanent damage done by this bog-burst is to the lake itself. Where formerly good pike-fishing was obtainable, there now stretches a useless black slimy flat, and the fish in the portion of the lake that still remains are few and small.

NOTES FROM A TRIP TO IRELAND'S EYE.
BY ERNEST BLAKE KNOX.

IN the second week of May last, accompanied by my brother, I secured a boat at Howth, and crossed to Ireland's Eye. On the water outside the island we observed several bunches of Razorbills and Guillemots, while sunning themselves on the rocks with outstretched wings were Cormorants and Shags. Only one representative of the duck family did we see, a common Sheld-Duck bobbing up and down in the water off a sandy point studded with rabbit-holes, of which I made a mental note to examine later on.

As we rowed slowly along within easy distance of the shore, numbers of Ringed Plover, Tit-Larks, and a few Oyster-catchers kept crossing us, seeming to resent our intrusion by their piping cries. Having need of some pebbles to use with a catapult against the cliffs I landed ; and while picking them I found two Ringed Plovers' nests, with their usual four eggs end to end. The nests were placed well above high-water mark, on a part of the beach where sand and gravel were fairly mixed ; each nest was a mere shallow cavity in the sand, lined with little bits of broken shells and small white pebbles, the white lining being quite a contrast with the surrounding darker beach when the eggs were taken out.

We then rowed round the island keeping close to the cliffs, and saw several Black Guillemots leaving their fissured retreats, which on examination proved empty, as they had not as yet begun to lay. There was quite a number of Herring-Gulls' nests to be seen. Two of us clambered up to the top of the stack and examined several of their nests, some having the full clutch—three eggs. The nests themselves showed some slight difference in the materials used for their construction, the bulk of each being of fine dry grass and Bracken, the outer covering being either lichen or seaweed. The Gulls kept flying round screaming, almost daring to attack us whenever we should get on the more difficult parts of the cliff. Several Guillemots, Razorbills, and Kittiwakes were sitting on the ledges, but laying had not become general among them as yet.

Further round the island, on the north side, we found a pair of Peregrine Falcons breeding, with young in their nest, their abode being above a colony of Gulls, the whir-r-r of the Falcons' wings as they shot downwards among the Gulls being very striking to the ear. On this part of the island we disturbed a few Puffins.

After lunch we all landed, and separating, closely beat the island, finding nests of the Lapwing, Shore-Lark and Tit-lark, and numbers of Ringed Plover. On the beach near where it joined the sod, among the larger gravel, we came across an Oyster-catcher's nest which was merely represented by a slight hollow in the sand, no attempt at lining being present whatsoever.

Among the rabbit-holes on the point off which we saw the Sheld-Duck, I made a careful search, and after some time came across a suspicious-looking hole, having the characteristic odour of the duck family. No such thing like a spade being obtainable, I set to work to excavate away the sand with a small piece of board I picked up on the strand. After a good deal of energy and loss of heat I was able to touch something soft at the end of the hole, which proved to be the female bird. Pulling her out I gave her her liberty, and proceeded to investigate the nest. The nest was made of bents with a lining of soft down off the bird's breast, and contained two young birds and four eggs which were chipping. Having tried to settle things as I found them, we went some distance off, and after some time had the satisfaction of seeing the female bird return to her nest. In another rabbit-hole we found a Wheatear sitting on eggs.

As light was failing, we had to leave the island, after a very enjoyable day. I was quite surprised to find such an interesting collection of birds breeding so close to the city, and hope that this short sketch will be the means of protecting rather than diminishing their security.

ANNELIDS NEW TO IRELAND.

BY THE REV. HILDERIC FRIEND.

AMONG the material which I have collected in Ireland, or received at various times from my esteemed correspondents, I have found a number of species of annelids which, while known from other countries, are new to Ireland, and usually to the British Isles. A few of these will be described or recorded in the present paper.

On June 18th, 1897, I received some specimens from Dr. Trumbull, of Malahide, with the remark that they were "from moss among the Portmarnock sandhills in this county (Dublin). I first came upon them in November last (1896), but they were then too immature for identification." From my study of the material received, together with the published accounts, I am able to draw up the following account.

I. Fridericia Ratzell (Eisen).

The full-grown specimens were fully an inch in length, corresponding with the 30 mm. of foreign authorities. The worms are very strong and active, being able to jerk themselves to a considerable distance by bending the body round in different directions, as an eel or Purple Worm (*Lumbricus purpureus*, Eisen) will do. They are pinkish in the adult, but white in the younger stages. The setæ in the front segments are usually six in number, or three pairs in each bundle, the innermost being about two-thirds the length of the outer pair. This is one of the characteristic features of the Fridericias. The setæ are strong and stout, in highly muscular sacs; a fact which fully accounts for the activity of the creatures when excited. On segment 12 a pair of orifices, with protrusible sacs, are found. Internally we find the brain rounded off posteriorly, not concave as in many worms. I could not, however, detect any 'copulatory glands' or enlargements of the nerve-cord on segment 13 as described by Hesse, though they are perfectly familiar to me in many other species. They are not mentioned by Ude or Eisen, so that possibly Hesse was examining an allied form. The body is striated as in many other Enchytraeids. One peculiarity deserves special note. In a young specimen just a score of opaque white bodies appeared in the coelom of the middle and hinder segments, which proved to be eggs. They were apparently being gradually passed out of the body by the anal orifice.

2. *Mesenchytraeus fenestratus*, Eisen.

The middle of May, 1897, Dr. Trumbull collected some specimens near the waterfall, Powerscourt, Co. Wicklow, one of which I examined. It had, however, begun to decompose when it reached me, so that it was not in a fit state for identification, and I had no duplicate with which to check my diagnosis. I have, however, every reason to think that it belonged to the species named above, the number and shape of the setæ, with some other characters, being sufficient to indicate its genus satisfactorily, as well as shadow forth the species. Perhaps some other collector will favour me with material from the same locality that the species may be made absolutely certain.

3. *Limnodrilus udekemianus*, Clap.

I received from Dr. Trumbull on April 1st, 1896, a very interesting consignment, which included specimens of this worm or a very close ally. The descriptions which I have seen are very meagre, but for the present this is the only name which will fit my material. One specimen had a regenerated tail, which was interesting, because it had not yet been differentiated into segments; setæ usually about five or six per bundle in the anterior segments, four behind the girdle. Female pores prominent in front of setæ; dilating heart in segment nine, sometimes, when throbbing, reaching into segment ten. There were no penial setæ, and the penis-sheath was not more than four times as long as broad. This curious structure is trumpet-shaped, and closely resembles that of my new species (*L. wordsworthianus*) found in Cumberland. This genus has uncinate setæ only, and the upper tooth is much larger than the lower in this species. The receptacles are very elongated pear-shaped bodies, without coils. There is reason to believe that the fresh waters of Ireland would yield several species of *Limnodrilus* if carefully worked. I have since received this worm from Co. Antrim by the kindness of Dr. Trumbull.

By a curious oversight I find I omitted to include among the species found at Belfast (supra, p. 63), one which was exceedingly plentiful, and about whose identity there could not be a moment's doubt. I therefore include it here.

4. *Pachydrillus verrucosus*, Clap.

In March, 1897, I received specimens of the same worm from a collector at Grantham, in Lincolnshire, England, but I believe that the worm has not heretofore been reported as British. Mr. Beddard's definition shows it to be about 12 mm. in length, with an average of 40 segments and three to five setæ per bundle. It is a flesh-coloured or red-blooded worm, and when seen in numbers, as under the algæ of the Connswater, is quite conspicuous. Descriptions of each of the foregoing, with full bibliography, will be found in Beddard's 'Monograph of Oligochæta.'

THE DISCOVERY OF BONES OF THE GREAT AUK
IN COUNTY WATERFORD.

BY R. J. USSHER.

I RECENTLY sent to Professor Newton some birds' bones, found by me in kitchen-middens on the coast of this county, from which I have also obtained bones or horns of Ox, Goat, Horse, Pig, Red Deer, and domestic fowl; an abundance of shells of Oysters, Cockles, Mussels, and Limpets, with many pot-boilers or burned stones. I have just received back the birds' bones from Professor Newton, who kindly writes as follows:—

"Cambridge, 8th June, 1897.

"I think all but two of them are fairly determined, thanks to the care bestowed on them by Dr. Gadow. The real work of determination was done by him, though I have gone over it for my own satisfaction. I congratulate you on possessing remains of at least two Great Auks, for you will notice that the two coracoids are of the same side. I hope you will duly record the occurrence of *Alca impennis*. Read in the light of these relics, Mr. Davis's famous bird of 1834 must have been visiting the home of its forefathers."

On the 14th June, accompanied by Mr. Percy Manning, I revisited the kitchen-middens, and we picked up some additional birds' bones, which I submitted to Dr. Gadow, who again kindly determined them. They contained a humerus, tibia, and metatarsus of Great Auk.

Bones of this extinct bird have been found in the kitchen-middens of Denmark, in one or two places in Scotland, in Durham, and on the North American coast. More recently, Mr. Knowles, of Ballymena, has found them on the Co. Antrim coast.¹ I am glad to be able to corroborate his discoveries, and to show that the range of the Great Auk extended in Ireland nearly as far south as 52° N. latitude; and I should like to know if its remains have been found so far south in Europe before. Careful search should be made for similar remains in kitchen-middens on other parts of the Irish coast, and those who do so should bear in mind that no bit of birds' bone obtained from such a source should be discarded until examined by a competent expert.

I wish to express my obligations to Dr. Gadow, to whose painstaking kindness we owe the knowledge of this interesting discovery.

¹ *Proc. R. Irish Academy* (3), Vol. iii, 1895, No. 4, pp. 650-663.

THE BOTANY OF A RAILWAY JOURNEY.

BY R. LLOYD PRAEGER, B.E.

As the train steams out of the terminus at Belfast, the high hills which overhang the western end of the city rise into view. In the foreground are tall mill-chimneys and factories built of bright red brick, and the graceful twin spires of St. Peter's Church; and behind rise the brown mountains, the southern escarpment of the lava-plateau of the north-east. The Chalk shows out in white patches on the slopes, where it is being quarried; higher up the dark basalt forms a sombre capping. This volcanic district has a flora of its own; and many of the characteristic plants are species usually found on limestone hills. It is on the cliff-ranges of the grand coastline of Antrim that this flora attain its full development; but even on the rounded hills which look down on us, and on the rocks and in the glens adjoining, some interesting species occur—*Vicia sylvatica*, *Epilobium angustifolium*, *Circeæ alpina*, *Saxifraga hypnoides*, several rare Hawkweeds, *Pyrola media* and *P. minor*, *Orobanche rubra*, *Juniperus nana*, *Equisetum umbrosum*; and two others, *Adoxa moschatellina* and *Equisetum trachyodon*, have here their only Irish habitat. The train now gathers speed as it glides onward, with the populous Lisburn-road suburb on the left, and on the right the marshy stretch known as the Bog Meadows—classic ground to the Belfast naturalist. Close by, on the left, stands the old mansion of Cranmore; and here it was that John Templeton lived and laboured a hundred years ago. He was a man of wide sympathies, a keen observer, a loving and reverent student of nature; and he was the pioneer of natural history studies in the North of Ireland. The volumes of manuscript which he left behind him, intended to form part of the “*Flora Hibernica*” which he projected, bear eloquent testimony to his skill and accuracy as an observer, and to his talent as an artist; it is much to be regretted that no part of his notes or drawings was ever published.

The train rattles through Dunmurry, and onwards towards Lambeg. By the side of the railway here *Vicia sylvatica* has come down from the glens on the hills, and grows luxuriantly. Now we speed past the bleach-greens of Glenmore, which the

pen of Mr. J. H. Davies has made familiar to the readers of this Journal as the only north-eastern station for *Poterium Sanguisorba*. Its nativity here has been called in question. It grows in an old meadow on the Bunter sandstone; in general it is found on limestone. However it may be with this species, there can be no doubt regarding the claim of another calcicole plant, *Orchis pyramidalis*, which grows on chalk quarry-rubbish over yonder on the side of the White Mountain a few miles to the eastward; elsewhere in District XII. it is found only on the sands of Magilligan, in County Derry.

That tall yellow flower which brightens the embankment is *Crepis biennis*. About Belfast it is as abundant as its ally *C. taraxacifolia* is about Dublin; yet the former is unknown in the northern district, and the latter is not found in the metropolitan area. Both have been originally introduced with grass and other seed, and have now fairly taken possession of their respective territories. *C. taraxacifolia* appears to be spreading more rapidly than *C. biennis*, and is now found almost across Ireland, and far to the southward.

From Lisburn to Lurgan is a pretty run through the fertile hillocky country so characteristic of the Ordovician area of the north-east. The canal which we thunder across at Moira is fringed with two interesting plants—the Flowering Rush, *Butomus umbellatus*, and the Sweet Flag, *Acorus Calamus*. The latter is believed to have had its origin in Sir John Rawdon's gardens at Moira, where it is known to have been planted prior to 1744¹; it now grows in abundance along the canal, from Lough Neagh to near Belfast.

Now we get glimpses of Lough Neagh out to the north-west, its smooth surface glistening in the afternoon light; we see the low promontaries of the southern shore, and the wooded Antrim edge; and far across the wide expanse rise Slieve Gullion, and the Sperrin Mountains, in Derry and Tyrone. To the botanist, Lough Neagh brings pleasant recollections—visions of shores glowing with Purple and Yellow Loose-strife, which alternate with patches of Bull-rushes and Reed-mace. What a paradise these lake-shores

¹Harris: Ancient and present State of the County of Down, pp. 103-4, 1744.

must have been before the drainage operations in the middle of the century laid them bare, and drove away many of the rarest plants from their habitats! *Calamagrostis Hookeri* is gone from several of its stations, but happily survives in others; *Carex Buxbaumii* appears to be on the verge of extinction; *C. elongata*, *C. filiformis*, and *Cladium* have disappeared; *Tolypella nidifica* has never been refound; *Subularia*, *Lathyrus palustris*, *Pilularia*, formerly abundant, are now very rare; *Sium latifolium* and *Elatine Hydropiper* have not been seen at the lake by the present generation; *Rhamnus catharticus* seems to have gone too, though the rarer *R. Frangula* survives in one station at least; *Lastrea Thelypteris*, formerly plentiful, we now seek in vain. Truly the interests of the botanist and the agriculturist are widely divergent!

A long whistle heralds our entry to Portadown, and our rapid rush down into the valley of the Bann ceases amid the hum of the vacuum brake. We are soon off again, and cross on a jingling iron bridge

“The gay little river
That smiles as it flows to the main.”

The Bann is here a slow and deep stream, bordered by green pastures, and frequented by canal-boats; and for the botanist offers little interest. Jerking across the points, we now turn southward, and speed along with the flat river-meadows on the left, and Brackagh Bog on the right hand. The bog is for the most part cut away, and pools and swamps are left, where Sundews (*Drosera anglica* and *D. rotundifolia*), and Bladderworts and Royal Fern grow; and from this place Mr. Lett recently added *Lycopodium clavatum* to the flora of Armagh. Beyond Tanderagee, the railway runs alongside the Newry Canal, here bordered by deep pools. From the train we catch sight of tall plants of *Cicuta* and of *Œnanthe Phellandrium*. White and yellow Water-lilies float on the surface, and among them Water-hens and Dabchicks splutter out of sight as the train thunders by. The canal is fringed with a grove of Arrow-head and floating Bog-bean in full blossom, and as we flash past we wish for an opportunity of exploring a spot that looks so promising. The speed decreases as the line begins to ascend, and climbs along the slope on the Armagh side to Goraghwood Junction, perched on the steep hill-side. And now we get a

glorious prospect. All County Down lies spread to the eastward, billow upon billow of green and brown fields, which towards the south give way to higher ridges, dark with heather; and behind these rise the Mourne Mountains. Far to the eastward, beyond the rugged crags which crown Slieve Bearnagh, towers the sunny dome of Slieve Donard. The western end of the range presents a series of high ridges which, above Rostrevor, drop suddenly into the waters of Carlingford Lough. Facing this steep slope rises the bold rugged form of Carlingford Mountain. Here is a district not half as well known to the naturalist as it ought to be. The deep untrodden valleys and high granite cliff-ranges of the Mournes can vie in interest and beauty with any mountain-range in the kingdom. And, though not rich in Alpine plants, the botanist finds delight in climbing the cliffs for *Hieracium argenteum*, or searching for the rare *H. hibernicum* and the Parsley Fern, or gathering the lovely Welsh Poppy above Rostrevor, or the Narrow-leaved Willow-herb on Eagle Mountain, where the cliffs re-echo the scream of the Peregrine Falcon and the hoarse croak of the Raven.

Meanwhile we are steadily climbing, past Bessbrook, and along the slope of Camlough Mountain. We have left behind the Ordovician lowlands, and are in a region of volcanic rocks. As we cross the Dundalk road, we get a beautiful view of Newry lying in the valley below, and then plunge in between the high rocky walls of Wellington Cutting, to emerge on the boggy elevated plain that stretches between Slieve Gullion and the mountains of Louth.

Here we have a different flora. Splashes of purple Heather pass in rapid succession, and the heads of the Sheep's Scabious flicker everywhere like blue stars. The dreary bogs gleam white with patches of Cotton-grass, lit up here and there with red daubs of Lesser Sorrel. And now on our right hand towers the long ridge of Slieve Gullion, clothed with woods below, deep with heather above. The little lake of Calliagh Berras, which lies close to the summit of the mountain, is famous as the scene of the enchantment of the hero Fionn by Miluera, the daughter of Culand the smith; and hard by, on the hill-summit, Fionn was restored to his youth and beauty by means of a magic drinking-horn.

Where the horn fell on the ground, a thicket of slender twigs grew up; "and any one who looks on it in the morning fasting, will know in a moment all things that are to happen that day."¹ I have searched for this thicket in vain; but possibly my want of success was the result of my visits being post-prandial.

Now we are over the summit; Ulster lies behind us, Leinster in front, and we rush down into the plain of Dundalk, with the rugged hills which surround Forkill on the right, and the wooded slopes of Ravensdale Park on the left. The pace is very fast, and the long bogie carriage hums like a big top, and rolls like a ship at sea. We slow up as we cross the bridge over the muddy river at Dundalk, and for the first time we see maritime plants—Sea-Pinks and Sea-Asters, *Statice Bahusiensis* and *Atriplex portulacoides*; a moment later we draw up at the broad island-platform of the new station. Here we are again on the Ordovician grits, which are seen in low cuttings on each side of the line; but eastward and southward they are buried under recent estuarine deposits. The shores of Dundalk Bay are the flattest portion of Ireland that I have seen. The tide ebbs nearly out of sight across the muddy sands, as it does at Morecambe Bay; the shore is occupied by a broad dreary stretch of salt-marsh, which gives way as one goes inland to swampy meadows, with broad ditches and slow-flowing streams. The salt-marsh is stained grey with the leaves of *Atriplex portulacoides*, and in August is purple with the flowers of *Statice Bahusiensis*. *Artemisia maritima* finds its northern limit by the river below Dundalk. Two other characteristic salt-marsh plants of the Dublin district, *Trifolium fragiferum* and *Statice auriculæfolia*, do not come quite so far north, but appear to stop at Clogher Head, twelve miles to the southward.

Leaving Dundalk, we are soon flying across this flat country. The pools by the side of the line are full of Frog-bit, and we catch sight of the lovely yellow blossoms of the Common Bladderwort rising out of the water. Beyond Castlebellingham we cross the end of an extensive bog, which was visited by the Dublin Field Club in 1895, on which occasion Dr. M'Weney obtained here a fungus new to science,

¹ See Joyce's "Old Celtic Romances": The Chase of Slieve Cullinn.

Stysanus Ulmariae. This bog is one of the few east coast stations for the Royal Fern ; from our carriage we can see fine clumps of green fronds tipped with golden-brown fructification. A stop at Dunleer enables us to note a large *Galium*, either *Mollugo* or *sylvestre*, growing abundantly on the edge of the line just south of the station. We turn eastward now, to avoid the high ground that stretches seaward from Collon, and are soon rushing down hill into Drogheda, with the two spires of Termonfeckin on our left, and beyond them the shimmering expanse of the Irish Sea. As we cross the lofty Boyne viaduct, we glance to the right at the busy town, built on the high steep river-bank, and the line of steamers in the water far below ; and to the left, where marshy meadows and brackish lagoons fringe the river. Beyond them lie the yellow sandhills of the coast, and the open sea. Interesting ground for the botanist, is this estuary of the Boyne. The sandhills yield *Festuca uniglumis* and *Centunculus* and *Filago minima* and *Cuscuta Trifolii* ; the salt-marshes *Trifolium fragiferum*, *Artemisia maritima*, and abundance of *Chenopodium rubrum*, which is apparently very rare in Ireland in stations which are above suspicion ; the great Island of Aran is the only other place where I have seen it in which it appears undoubtedly native.

As we pass into Drogheda Station *Sambucus Ebulus* is noticed growing on the east side of the railway. When we get under way again our course lies south-east, and at Laytown we strike the coast. We cross on a new bridge the Nanny River, where *Zostera nana* grows in the soft ooze, and pass along close to a beautiful yellow beach backed by sandy and swampy ground. Here the tall blue spikes of the Viper's Bugloss brighten the landscape ; it grows mixed with Dyer's Rocket and coarse Burdocks. This spot is the most northerly point to which I have succeeded in tracing that very local plant *Senecio crucifolius*. It grows by the railway at this place, and again at Laytown Station, and is abundant southward as far as the further end of County Dublin. The late Dr. Moore has recorded it from "between Drogheda and Dundalk," which furnishes an interesting extension of range ; and I wish that some botanist more keen-eyed than myself, would verify this record, which I have vainly tried to do. The locality is exceedingly indefinite.

In crossing the Boyne we have left Louth behind us, and entered Meath; and we have also at last changed the Ordovician slates for the Carboniferous limestone. The change of soil makes itself felt upon the flora. We see for the first time the bright rose-coloured spikes of the Pyramidal Orchis, the yellow flower-heads of the Rough Hawk-bit, the erect stems and leaves of the Yellow Goat's-beard, and the fruit-heads of the Cowslip. Just beyond Gormanstown we cross the Delvin River, and enter County Dublin. Balbriggan, with its pretty little harbour, is left behind, and soon the large gravel-pit at Skerries attracts our attention by its fine section of false-bedded and contorted glacial gravels. This spot yields many of the characteristic plants of the Dublin neighbourhood. The botanist coming from the north will note with interest the occurrence of the Blue Flea-bane (*Erigeron acris*), the Greater Knapweed (*Centaurea Scabiosa*), *Melilotus officinalis*, the Carline Thistle, *Diplotaxis muralis*, *Geranium pyrenaicum*, &c.—plants, many of which extend westward across the Limestone Plain, but are rare or absent further northward.

We speed onward, and soon cross the muddy estuaries that lie north of Malahide, where *Zostera* and *Salicornia* dispute the ground with seaweeds, and the shining leaves of the Beet fringe the stone-pitched margin of the railway. The pace is too fast for botanizing now, and from our carriage we can only guess at the identity of the flowers that show as flashes of colour of varied hue. But this familiar ground brings back many pleasant recollections of long field-days. Lambay Island, Malahide, and Portmarnock are classic ground to the Dublin naturalist; and yonder rises, a couple of miles away, the heathery Hill of Howth, dear to every botanist. Now we are past Raheny, and dash out of the long cutting, across the Clontarf road. The city bursts upon our view, and behind it the rounded granite hills of Dublin, and the quartzite peaks of the Great and Little Sugar-loaf. As we enter the town and slow down, we see banks and patches of waste ground covered with the familiar Field Poppy and Slender-flowered Thistle and Wall-Barley—characteristic plants of the Dublin suburbs; a minute more and we glide into the terminus at Amiens-street, our three-and-a-half hour run of 113 miles completed.

PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Rosella Broadtail from Mr. J. K. Richardson, a White Peacock from Mrs. A. E. Lauder, a pair of Cockatoos from the Rev. D. Greatorex, a Peacock from Mrs. Beck, a pair of Marsh Harriers from Mr. H. M. Smith, and a Cockatoo from Mr. J. B. O'Callaghan. Four Golden Agoutis have been bought.

16,900 persons visited the gardens in June.

THE IRISH FIELD CLUB UNION.

EXCURSION TO BALLYCASTLE.

The associated societies held their annual excursion on the 2nd, 3rd, 4th, and 5th of July. On this occasion the members visited the north coast of Antrim, making Ballycastle the centre—a district full of interest to the naturalist and picturesque in the extreme. On the 2nd July the members of the Dublin Club and others joined the Belfast Club at the Northern Counties Railway, and took train to Ballycastle. Arriving here, the party proceeded to the Antrim Arms Hotel, which was made the headquarters during their stay. Early luncheon awaited the party, after which brakes and cars were mounted, and the start made to visit and explore the sands of White Park Bay and the neighbourhood round Ballintoy. From the new road, which was the route selected, one gets a good idea of the geography and general character of the country. As the summit of the road is reached, an extensive panorama of the district opens up. To the north the white cliffs of Rathlin Island are seen; to the east, far in the background, lies the Mull of Cantyre, with Fair Head as a middle distance, whilst in the foreground Ballycastle and the shores of its bay were bathed in sunshine; to the south and west are seen the peat bogs, now white with Bog-cotton, and on the sloping hills the well-tilled farms; whilst Knocklayd rises, with its basalt-covered dome, high above the whole district. At White Park Bay a halt was called, when the party soon scattered over the sand-dunes in search of worked flints and pottery. The late storm had cleared the sand from many of the likely sites, and soon a fair number of finds were made, including some pieces of pottery with rude sunk ornament, whilst pockets in the sand yielded good results to the conchologist. The botanists found the beautiful Meadow Crane's-bill, or Flower of Dunluce, in brilliant bloom throughout the day. The Lias beds which occur in the bed of the stream at the east end of the bay were not well exposed *in situ*, as much weathering and slipping appeared to have taken place, but blocks of the Lias which were found yielded numerous and characteristic fossils. Proceeding by the shore the scenery became more rugged and the geology of more interest. Here sea-stacks and tunnels in the rock were observed, whilst the beds of bole and lithomarge showed as brilliant bands in the dark rock. Passing Ballintoy Harbour and the quaint old wind-swept church, the village was reached, where afternoon tea was served

at the Temperance Hotel. The party then proceeded past the quarry of ophitic olivine-dolerite to Carrick-a-Raide, where the volcanic neck and the characteristic beds of ash, with included fragments of basalt, were observed. The cliff scenery is here very fine and imposing, the danger of the swinging bridge heightening the attraction of a coast awe-inspiring in its grandeur. After this the road was taken for Ballycastle, but occasional halts were made at likely botanical localities, and also to see the very beautiful example of fine-grained and columnar basalt on the roadside near Glenstaghy. Dinner was ready when the party reached their hotel at eight o'clock. Afterwards some of the members proceeded to the woods in search of moths, spending several hours wandering about amongst the trees with a lantern examining different plants and the sugar-smeared trunks of trees. The programme for the second day took the party to Fair Head and Murlough. A start was made shortly after nine o'clock along the shore road to the sandstones and shales with coal-seams near Colliery Bay. Judging from the extent of the shafts found some time ago, these seams were worked extensively in early times, but latterly they have been altogether neglected. There is now another start being made to open these mines, and the party found a steam-engine and pump in full work clearing the shaft of the mine not far from Bath Lodge preparatory to further work. At many sections of the shales fossils were found, chiefly *Stigmaria ficoides*, *Sphenopteris*, *Sigillaria*, and their mode of occurrence was noted and the age of the rocks was explained. On reaching Carrickmore the ascent of Fair Head—one of the finest headlands in Ireland—was made, and extensive views obtained from the summit. Passing Lough-na-Cranagh, the Gray Man's Path was approached, and near this the immense and almost completely detached columns of basalt were observed, whilst a fissure was noted which gives promise of a change in the scenery at some future time, when the overhanging rocks of this headland will go to increase the enormous talus of blocks already formed at the foot of the cliffs. Whilst these general features were being observed, some of the naturalists noted the occurrence of the Peregrine, and of Hooded Crows, which were frequent all along the coast. The botanists on the descent collected specimens of the Rose-root, Welsh Poppy, and Narrow-leaved Willow-herb. Soon the wooded slopes of Murlough Bay came into view. On reaching the shore, lunch was served at Miss Clark's cottage, after which the members broke up into parties to go in search of specimens and finds, and to explore the woods, which form a good collecting-ground for zoologists and botanists. A shower of rain had brought out a large number of the commoner species of land and fresh-water shells, which were collected in abundance, whilst *Helix arbostorum* was found on the grassy slopes under the Chalk cliffs. Further round the coast a few specimens of type and variety *cincta* were noted. *Helix rotundata* was fairly common, with a thin, fragile variety of *H. nemoralis* on the headlands to the east. Here the rare *Helix fusca* was also found among the Wood-rush on the wet glen slopes, with *Hyalinia* and *Pupa anglica*. The botanists collected the Yellow Saxifrage, Brittle Bladder-fern, Mossy

Saxifrage, and Bree's-fern. The land planarian *Rhynchodemus terrestris* also occurred here as well as in other localities. In fresh water, *Polycelis cornuta* was very widely distributed, occurring right down to the shore, although on the Continent this species frequents high altitudes. Other planarians not yet identified were collected. Some of the geologists went round Rue-Bane Point, and the stiff climb was well repaid by the view of some splendid dykes and sills of diorite (camptonite of Rosenbusch), which are here seen about six feet thick, with fragments of embedded crystalline schists on their margins. On the return, near the summit of the slopes of Murlough, a visit was paid to the interesting conglomerate at the base of the Chalk, and overlying the brilliant red beds of sandstone which have of late been the subject of investigation by Dr. Hume. On reaching the road again, cars were taken for Ballycastle, and fine views obtained of the gravels and well-marked terraces of the Carey River. After a late dinner an exhibition of bat-hunting was given by some members, which caused much amusement to the natives of Ballycastle, and resulted in the capture of *Vesperugo pipistrellus*. Late in the evening a conversazione was held, when the members made a display of, and explained, their various finds, and a very beautiful collection of land shells obtained in the neighbourhood were exhibited by Mr. Standen, of Manchester, and showed what could be done by a well-directed search over this locality in a short time. Sunday was an open day, and members made their own arrangements. Good weather and sunshine favoured the party all through, but on Monday the weather looked less favourable, and there were some showers. However, all the members turned out at the sound of the whistle, and a start was made for the valley of Glenshesk. The road to the bridge was taken, where the party dismounted, and were soon in pursuit of various objects, a few to visit the micaceous schists in the bed of the stream. The damp state of the ground prevented most of the members from attempting the ascent of Knocklayd, which all through the morning had been capped with cloud and mist, so attention was concentrated on the ravines and burns on the eastern slopes of the mountain, which yielded, as usual, some good species. The Fresh-water Limpet (*Ancylus fluviatilis*) was noted to be unusually large and fine for this county. Under one of the bridges the nest of the Dipper was found, and some of the members observed the bird in flight. Botanists collected the Moonwort, Stag-horn moss, Mountain Buckler-fern, and Bree's-fern. All again assembled at the hotel after four o'clock for dinner, after which, as this was the last day of the excursion, a few remarks were made by some of the senior members expressing the pleasure derived, and the many advantages of combined excursions, such as the present. The 6.15 train brought many of the members to Belfast, and others remained to return the next day by rail or road—the general impression that a most delightful and instructive holiday had been brought to a close, one that would be long remembered by those who took part in it.

NOTES

BOTANY.

PHANEROGAMS.

Carex filiformis and Cladium Mariscus in Co. Down.

One day last May, driving from Strangford to Downpatrick, I observed in a reedy lake, not far from the road, groves of a tall sedge-like plant which, even at a distance of a quarter of a mile, I recognised as *Cladium Mariscus*. A visit to the lake showed the plant growing abundantly and luxuriantly; and, better still, the swamp was dotted all over with a sedge which, though only in flower, I felt sure was *Carex filiformis*. My brother, E. A. Praeger, has since re-visited the spot, and sent mature fruiting specimens, which show that my diagnosis was correct. This lake, or swamp with pools, lies not far from the main road from Strangford to Downpatrick, half a mile north-west of the hillocks marked "White Hills" on the one-inch Ordnance Survey map; and both the species named grow therein in abundance. These are two of the rarest members of the North-eastern flora. *Cladium* was found near Castlewellan by Templeton, and after an interval of a century was re-discovered growing sparingly there by Mr. Stewart and myself; its only other station, and the only station of *C. filiformis*, was Selchin, on the Antrim shore of Lough Neagh, where they grew with *C. elongata*, as discovered by Dr. Moore some sixty years ago. *Cladium* had been previously found there by Templeton. None of them have been seen in that station since, having been, no doubt, destroyed by the drainage operations carried out between forty and fifty years ago. *C. filiformis* was excluded from the local flora by Stewart and Corry in 1888 as doubtful, but was re-inserted in the *Supplement*, published in 1895, on the strength of specimens from Selchin discovered in Dr. Moore's herbarium. In view of the extinction of these two plants at Lough Neagh, and the paucity of *Cladium* in its only other local station, it is satisfactory to have a new locality where both grow abundantly, and are in little danger of a similar mishap.

R. LLOYD PRAEGER.

Occurrence of Callitricha truncata, Guss., and Leucojum aestivum, L., in Ireland.

During an afternoon ramble among the Slaney marshes, a little north of Macmine Junction, Co. Wexford, on June 11th, I had the good fortune to come across these two nice plants, not far from Macmine Castle. The former was plentiful in a broad ditch which the railway crosses, and in an adjoining pool; the latter grew in a swamp near the river, some sixty or eighty specimens being observed in flower or fruit; it looked quite as wild as I have seen it in England. These marshes deserve further examination; I only worked a small part of them.

EDWARD S. MARSHALL.

ZOOLOGY.

INSECTS.

Leucophasia sinapis near Kildare.

I found the Wood-white Butterfly in some numbers at a place I was staying at for a few days in the end of May and the beginning of June, about five miles west of the town of Kildare, this year. As this is, I believe, a new locality for it in Ireland, it may be worth recording. It seemed to prefer the open fields, or the proximity of small rows or groups of trees, to the plantations and heavy timber, which I would have thought more suited to it, but where I did not find a single specimen.

PERCY E. FREKE.

Entomological Notes from S.E. Ireland.

The following list of local insects captured by me while staying on a visit with my brother, Capt. Bonaparte-Wyse, of the Manor of St. John's, Waterford, during some seven weeks, extending from the middle of May to the end of June, may prove of interest to readers of the *Irish Naturalist* :—

LEPIDOPTERA.—*Leucophasia sinapis*, L.—I took a few of this generally scarce butterfly at Curraghmore towards the end of May and beginning of June. I have recorded the occurrence of this butterfly in Co. Waterford in the *Entomologist*, vol. xxx., p. 200; also the capture of a single specimen near Mileport, Co. Kilkenny—a new locality, I believe, for this local insect.

Lycæna argiolus, L.—This fragile little butterfly was very common during May in the woods of Curraghmore; it was quite over by the beginning of June.

Malitwa aurinia.—I found this local butterfly, not uncommonly, in a bit of marshy ground near Mileport, in the Co. Kilkenny, adjacent to a small fir-wood. The examples I took seem to be like the English specimens I have seen, with the fulvous patches of all the wings very uniform in hue. One female example, however, would seem to have the chief characteristics of var. *preclara*, Kane (vide *Entomologist*, vol. xxv., p. 159).

Vanessa cardui, L.—I observed this beautiful butterfly very commonly flying along the edge of the cliffs near Baginbun Head, Co. Wexford, on the 14th June. I did not meet with it elsewhere. *V. io*, L. was generally common at Curraghmore and other parts of the Co. Waterford. I also saw a few specimens of it near Mileport, in the Co. Kilkenny, towards the end of May. *V. atalanta*, L. was much less common. I only noticed a few specimens, chiefly in the same localities as the last.

Macroglossa bombyliformis, Och.—I captured a fine specimen of this moth on the 24th May at Curraghmore hovering over the flowers of Wild Hyacinth (*Hyacinthus nonscriptus*).

Ino statices, L.—I found this pretty species rather commonly at Curraghmore in various different localities during the month of June. I took a single specimen near Mileport, Co. Kilkenny.

Nemeophila russula, L.—This moth occurred in abundance in the same bit of marshy ground which *Melitaea aurinia* frequented near Mileport. I took a single specimen of it near Curraghmore towards the end of June.

Clistocampa neustria, L.—I found a larva of this species on the Youghal road, about a mile from Dungarvan, on the 1st June. I mention this because this moth does not seem to be of common occurrence in Ireland.

Saturnia pavonia, L.—I captured two specimens, male and female, of this beautiful moth on June 3rd in an open space in a small fir-wood near Mileport, Co. Kilkenny. I subsequently observed several male specimens of it darting over the heathy land adjacent to the wood, but was unable to make any captures. I was surprised to meet with this moth so late in the season.

Macaria liturata, Cl.—I took a rather worn example of this “Geometer” on June 3rd near Milepost.

Fidonia (Bupalus) pinaria, L.—I took a male specimen flying round a fir-tree on June 3rd near Mileport, Co. Kilkenny, and saw a few others. I believe there are only two previous records for this insect in Ireland.

COLEOPTERA.—*Cicindela campestris*, L.—I found this beautiful beetle in abundance in a certain locality at Curraghmore. The Rev. W. F. Johnson, to whom I sent a few specimens, writes me that it has not been previously recorded from Co. Waterford.

Carabus granulatus, L.—I found one specimen crawling on a bye-road in Curraghmore demesne.

Calathus melanocephalus, L.—Two specimens under stones at Roanmore, Co. Waterford.

Amara lunicollis, Schödte.—I took a single specimen of this scarce beetle under a stone at Roanmore on June 20th.

Geotrupes sylvaticus, Panz.—I found a specimen of this dung-beetle drowning in a rut full of water on a bye-road in Curraghmore demesne.

Malachius viridis, F.—This beetle I believe has not been previously recorded from Ireland. I took a single specimen at Curraghmore, in a bit of marshy ground bordered by trees, on June 5th.

Agriotes sputator, L.—I took a single specimen of this insect under a stone, on the sand-hills near Tramore, on June 21st. There is a slight doubt about this beetle. Mr. W. F. Johnson, to whom I sent this insect for identification, and several other species of Coleoptera, wrote me:—“I am not very sure of *Agriotes sputator*, but cannot make it anything else.”

Cassida viridis, L.—I took two examples of this curious beetle in a marshy bit of ground near Tramore, Co. Waterford.

I am greatly indebted to the Rev. W. F. Johnson for kindly identifying the majority of the beetles mentioned above, together with several other commoner species I had sent him to name for me.

Odynerus sinuatus (Fab.) in Co. Carlow.

I found this species common at Rhododendron blossoms this year at Borris, Co. Carlow, and also found it burrowing in an old wooden post on the bank of the river Barrow in some numbers. As it is new to the Irish list of Aculeate Hymenoptera it is worth recording.

PERCY E. FREKE.

BIRDS.**Mass-Migration of Birds at Londonderry.**

In the beginning of May a great mass-migration of birds passed over our city. It was observed by Mr. Wm. Roddy, editor of *Derry Journal*; Mr. Edward McCourt, our local bird-stuffer; and by many others who were in the street at the time. Mr. Roddy has kindly given me particulars of his observations. The flight commenced to pass over the city about 10.30 p.m., and between 11 and 12 was at its height. An hour or two later it dwindled down to scattered flocks. The number was beyond all calculation, not thousands, but hundreds of thousands, of birds. Mr. Roddy said that the columns were so great that he could only describe them by saying that "acres of birds passed overhead." The glare of the electric light so illuminated the sky that it was possible to distinguish the species now and then. Wild geese formed the outside columns, while the great bulk of the flight was made up of duck, Wigeon, Curlew, Oyster-catchers, and plover. Mr. McCourt heard the call-notes of both Golden and Ringed Plover, and a friend described to me how he had observed a flock of the former species, attracted by the glare of the electric light, circling round and round an electric lamp for some time before joining the mass of birds again.

The direction of the flight was from S. or S.W. to N.E. The columns were moving at a considerable height, but now and then a flock passed close to the roofs of the houses, attracted it may be by the electric light. The call-notes were incessant, and now and then above the cry of the plover and Curlew was heard a harsh "croak" like the cry of the Heron or the Great Northern Diver.

D. C. CAMPBELL.

The Icterine Warbler in Ireland.

With reference to the very interesting paper on the Icterine Warbler (*Hypolais icterina*) in the *Irish Naturalist* for May, I wish to point out that the birds heard by the Rev. A. Ellison and the Rev. Murray A. Mathew in Co. Wicklow and Pembrokeshire were (supposing that they belonged to the genus *Hypolais*), very probably examples of *Hypolais polyglotta*, the "Melodious Warbler," which has a more western range than has *H. icterina*, and is not at all unlikely to occur in the south or south-western parts of these islands; indeed, I believe that its nest has been found on one occasion at least in the South of England, although the fact was not proved. This species is smaller (perceptibly so in life) than *H. icterina*, and as one of the last-named observers compares the bird he saw to a Willow Warbler, and the other to a Chiffchaff, it is

probable that they saw birds which were smaller than *H. icterina*. The smaller species has a much finer song than has the larger; and I venture to think that some observers who have praised the song of *H. icterina* very highly, may, just possibly, in some instances, have had their opinion formed partly by the song of its more melodious relation. But this, apparently, could not occur in Holland, Germany, Norway, &c. However, when, last summer, I heard *H. icterina* on one occasion in Norway, I heard as I surmised I should (*Zool.*, 1896, pp. 125 and 228), a much better song from it than I did in North Africa. Mr. Benson might have referred to this further note of mine on the subject (*Zool.*, 1896, p. 418).

O. V. APLIN.

The Birds of Rathlin and Ballycastle.

In the July number of the *Irish Naturalist*, Mr. Standen, in his "Observations on the Fauna of Rathlin Island and Ballycastle," states "that the Chiffchaff and many other warblers abound." Now these observations with regard to Rathlin are quite the opposite of those of my friend, Mr. R. Patterson in his exhaustive list of the "Birds of Rathlin." He mentions the "Chiffchaff as only an occasional visitor, not known to breed. One was taken in an apple-tree in March, 1862. The Willow Wren is rarely seen—one caught alive near the Light-house, and another found in Mr. Gage's garden in April, 1867." While the Whitethroat is the only warbler mentioned as a "regular summer visitor," and even the Sedge-warbler is rare, according to Mr. Patterson; and neither Mr. Patterson nor Mr. Gage (in his list of the birds of Rathlin in the *Proc. Dublin Nat. Hist. Soc.* of December, 1861), mentions the Whinchat. So it is very evident that if the information received by Mr. Standen in reply to his inquiries is correct, a very great increase must have taken place in the visits of these warblers to Rathlin. I also wish to direct attention to the list of birds breeding at Cushendun given by the Rev. Mr. Brenan to Mr. Standen, in which the "Pied Flycatcher" is named, a bird so rare in Ireland that its capture has very seldom been recorded. The first specimen taken here at Moy View, Co. Sligo, in April, 1875, and two or three others at light-houses off the coast—e.g., at the Tearaght, September the 21st, and at the Fastnet October the 5th, 1886, and again at the Tuskar, 28th September, 1888, recorded by Mr. R. M. Barrington.

ROBERT WARREN.

"Pied Flycatcher" in Co. Antrim: a correction.

In my article on the "Fauna of Ballycastle District" in the *Irish Naturalist* for July (*ante*, page 174), I give the above species—on the authority of Rev. S. A. Brenan—as breeding about Cushendun. Mr. Ussher having pointed out to me the extreme rarity of this bird in Ireland, as an occasional visitor on migration, I communicated with Mr. Brenan, who informs me that it is the Spotted Flycatcher which he has observed, and not the "Pied Flycatcher," as inadvertently written in his list.

R. STANDEN.

House Martins nesting in Sea-Cliffs.

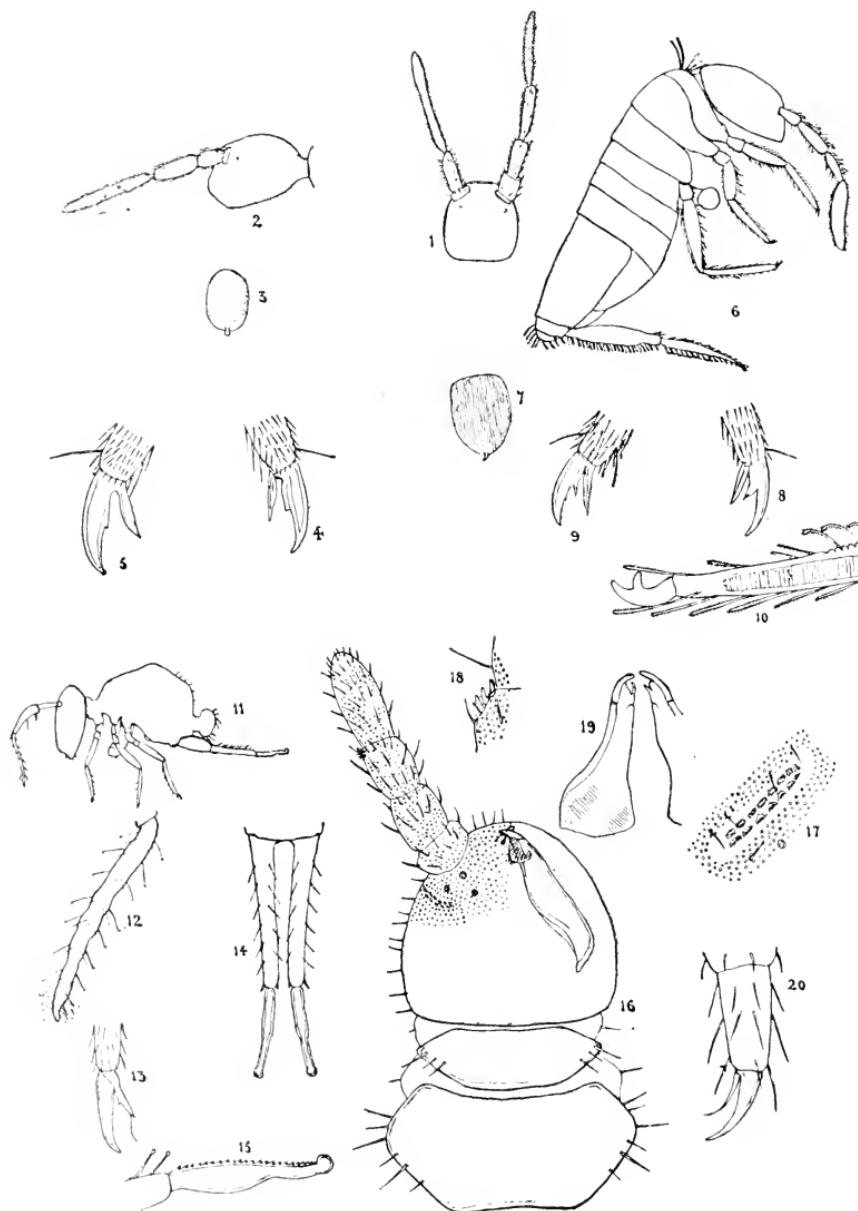
That House Martins originally built in cliffs and rocks is pretty evident, and that they do so in many places still is well known; but I was not aware until last month that they built in overhanging cliffs at Bray Head, about 30 feet above high-water mark. There are about seven pairs now breeding there, and from the situation of the nests it is quite possible that the waves might reach them in easterly gales.

R. M. BARRINGTON.

GEOLOGY.**Bog Bursts.**

I have been much interested in Mr. R. L. Praeger's admirable paper on this subject in the *Irish Naturalist* for June last, and can add another instance to the solitary one he records of the occurrence of this phenomenon in England (Solway Moss). In an article in the *Gentleman's Magazine* for 1745, the writer states that on "Saturday, January 26th, 1744, a part of Pilling Moss, in the district of Amounderness, Lancashire, lying between the rivers Wyre and Cocker, and situate between Eskham House and an estate of Mr. Butler's, of Wild Boar, was observed to rise to a surprising height. After a short time it sank as much below the usual level, and moved slowly towards the south side. In half an hour's time it covered 20 acres of land. The improved land adjoining that part of the moss which moved was a concave circle, containing near 100 acres, which was well nigh filled with moss and water. In some parts it was thought to be five yards deep. A family were driven out of their dwelling-house, which was quite surrounded, and the fabric tumbled down. A part of the moss, which was sunk like the bed of a river, ran north and south for about a mile in length and near half a mile in breadth, so that it was apprehended there would be a continual current to the south. A man who was going over the moss, to the eastward, when it began to move, perceived to his great astonishment that the ground under his feet moved southward. He turned back speedily, and had the good fortune to escape being swallowed up." This incident must have made a strong impression upon the inhabitants of the district, for it is still talked about, and I have heard the older people, in alluding to some particular event in local history, date from "the slipping of Pilling Moss."

R. STANDEN.



COLEMBOLA FROM MITCHELSTOWN CAVE.

[To face p. 225.]

THE COLLEMBOLA OF MITCHELSTOWN CAVE.

[Report on Material collected for the R.I.A. Flora and Fauna Committee.]

BY GEORGE H. CARPENTER, B.S.C.

[Plate 2.]

Two years ago in a paper (1) read before the Dublin Naturalists' Field Club, I described two species of Collembola from the famous cavern of Mitchelstown. Subsequently Mr. H. L. Jameson visited the cave and, during an exploration of several hours, obtained a large series of specimens of its insect inhabitants. He gave an account of his expedition before the Dublin Club, and published a short list of the various species observed, with some suggestive remarks as to their varying degrees of adaptation to cave life (2). The specimens which he collected were far more numerous than those obtained by the members of the united Field Clubs in 1894 and described in my former paper; while a large proportion of his material was in very good condition. I have, for some time past, been examining the insects with a view to supplement and correct my former observations.

The two species described by me in 1895 were the *Lipura* (*L. Wrightii*, Carp.) which the late A. H. Haliday and Prof. E. P. Wright discovered in the cave forty years ago (13) and a white blind springtail which I referred to the genus *Sinella* (Brook) under the name of *S. cavernicola*. The very large series of the *Lipura* which Mr. Jameson collected has enabled me to examine a number of specimens and correct several errors in my earlier description. The most important point now brought to light is that the species does possess a post-antennal organ, which Mr. Haliday and I both failed to find in the specimens we collected in the cave. As this organ is the best specific character in the *Lipurae*, it is of value in comparing our species with its congeners. Of the springtail

which I called *Sinella cavernicola*, Mr. Jameson found only three or four specimens. These are in much better condition than my types and it is evident that the species is scaled, not, as I supposed, destitute of scales. It is therefore not a *Sinella* and must be transferred to *Templetonia*. I may perhaps be forgiven for not having seen the scales which had been rubbed off, but I certainly should not have overlooked the proportions of the abdominal segments which I figured. Unfortunately I had not examined many springtails at the time, and I did not appreciate the importance of this character in the discrimination of genera.

A large number of white springtails, which I, at first, believed to be the young of *Templetonia cavernicola*, were collected by Mr. Jameson. Detailed examination has, however, shown that these represent a species new to the fauna of Mitchelstown cave and probably new to science. They are, I believe, referable to the genus *Cyphoderus*, but closely approach a French cave-species *Seira cavernarum*, recently described by Moniez (8) from the cavern of Dargilan, which according to that author might almost as well be placed in the *Cyphoderus*. But they differ sufficiently from his description to make a new name advisable, and I have pleasure in dedicating the species to the intrepid French explorer, M. Martel, whose journey through Ireland has done so much to arouse interest in the caves of our limestone districts.

Mr. Jameson has himself recorded (2) the occurrence in the cave of *Tomocerus tridentiferus*, Tullberg (*plumbeus*, Lubbock) which was found there by Messrs. Wright and Haliday. Among his numerous specimens of *Lipura Wrightii*, I now find a few examples of three other species, which, like the *Tomocerus*, are not typical cave-insects. These are *Achorutes armatus*, Nicolet, *Anurida granaria*, Nicolet, and *Smynthurus coccus*, Tullberg. The last-named species is a minute, white, eyeless springtail, which, though found in flower-pots on the Continent, should be quite at home in a cave. It does not seem to have been hitherto observed in the British Islands. Altogether, therefore, we are now able to record seven species of Collembola from the cavern of Mitchelstown. It remains to deal with each species in detail.

FAMILY SMYNTHURIDÆ.

Smynthurus cæcus, Tullberg (12)

Pl. 2, figs. 11-15.

The single specimen of *Smynthurus* found by Mr. Jameson, being white in colour and destitute of eyes, might naturally have been supposed to belong to a typical cave-species. The very characteristic spring (figs. 14, 15) with the elongate mucro, two-thirds the length of the dens, ending in a rounded knob, agrees exactly however with Tullberg's figures (12, pl. iii., ff. 24-5) of *Smynthurus cæcus*, a species found by him in flower-pots in Sweden, and since recorded by Reuter (10) from Finland. Tullberg states that this species is without eyes, and that its body is white with red spots. No trace of such markings is to be seen on the Mitchelstown specimen, but the disappearance of pigment would be a natural result of underground life, and is not of more than varietal value.

The antennæ of this species are long, the fourth segment being nearly as long as the second and third together; the third is greatly thickened specially at the proximal end; the fourth, as in many *Smynthuri*, is ringed and provided with whorls of clubbed hairs (fig. 12). The feet are destitute of clubbed hairs; the upper claw is simple, while the lower claw carries a small tooth near its base, and a long threadlike process near its point (fig. 13).

As mentioned above, *Smynthurus cæcus* is an addition not only to the fauna of Mitchelstown Cave, but also to that of the British Islands. So minute an insect—its length is only about 7 mm.—might be very readily overlooked, and it probably awaits discovery above ground in similar situations to those it affects in Sweden and Finland. It is possible, however, that, like so many other animals of northern range it will be found characteristic of Ireland, perhaps even altogether absent from England, though it should almost certainly be found in Scotland. Mr. Jameson's collection of the cave-insects was so extensive that he would probably have taken more than a single individual if the species had colonised the cave to any extent. Joseph (3) has described four species of *Smynthurus* from the Carniolan caves, to one of which he gives the name *S. cæcus*. He states, however, that it is nearly related to *S. fuscus*, Nicolet, which is a *Papirius*, not a true *Smynthurus*.

FAMILY ENTOMOBRYIDÆ.

Tomocerus tridentiferus (Tullberg). (12).*T. plumbeus*, Lubbock (4) nec Linnaé.

Messrs. Wright and Haliday found a springtail in the Mitchelstown Cave which they referred to this species (13). Mr. Jameson obtained several specimens not differing in any particular from the examples of this common species which one finds above ground. He remarks (2) that the insect seems equally at home in caves or in the upper world under stones. Packard (9) has recorded this springtail from North American caves.

In their recent systematic works, Schött (11) and Reuter (10) follow Tullberg (12) in regarding *T. longicornis* of Müller and Lubbock (4) as the true *T. plumbeus* of Linné. The present species (*T. plumbeus*, Lubbock) is readily distinguished from other species of the genus by the trident-like spines on the dentes of the spring.

Cyphoderus Martelli, sp. nov.

Pl. 2, figs. 6-10.

Sinella cavernicola, Jameson (2) (for the most part).

Antennæ one-and-a-quarter times as long as the head, second segment slightly longer than third, fourth segment still longer; thorax with a few clubbed hairs; fourth abdominal segment three and a half times as long as third (fig. 6). Upper claw of foot with a delicate but prominent tooth; lower claw three-quarters as long as upper (fig. 8, 9). Mucro of spring short and recurved, as in *Seira*, bearing a strong tooth. Dens with numerous long clubbed ciliated hairs (fig. 10). White, with a slight yellow tinge. Length 1.5 mm.

Mr. Jameson took a large number of examples of this springtail, which next to *Lipura Wrightii*, seems the dominant species in Mitchelstown Cave. It may, I think, be safely referred to the genus *Cyphoderus*, Nicolet, in its modern, restricted sense (= *Beckia*, Lubbock), as it resembles the type-species, *C. albinos*, Nicolet, in the form of its antennæ and the structure of its feet. The mucrones of the spring however are relatively much shorter than in *C. albinos*, and recall rather those of a *Seira*.

I have already alluded to the French cave-species *Seira cavernarum* described by Moniez (8) from the cavern of Dargilan. That insect would seem to agree to a great extent with the present springtail in the relative length of the abdominal segments, the structure of the feet, and the mucrones of the spring. The antennæ of the French insect, however, are more than half as long as the body, and this proportion seems to have led Moniez to place it in *Seira* rather than in *Cyphoderus* in spite of the absence of eyes.

The two European species of *Cyphoderus*, *C. albinos*, Nicolet, and *C. argenteus* (Lubbock) are both blind, so it would seem that our Mitchelstown insect is, in this respect, no more degenerate than its above-ground relations. *C. albinos* lives in various concealed situations, and is often found in ants' nests on the Continent. The blindness of various animals which live with ants is well known, as in the case of gamasid mites, the beetle *Claviger* and the woodlouse *Platyarthrus*; probably the darkness and the ease of gaining a living in the ant-colonies render sight needless, and so it may be that the blindness in the cave-species and in *C. albinos* has been independently acquired. It is noteworthy that according to Joseph (3) *C. albinos* is itself an inhabitant of certain caves in Carniola.

I have already indicated the difference in the form of the mucrones of the spring which separates our species from *C. albinos*. The third antennal segment, moreover, is much longer relatively in *C. Martelli*. In this last character the species resembles *C. argenteus* (Lubbock) (4), but it

differs from the latter in the scantiness of its thoracic tuft of clubbed hairs and the absence of any silvery reflection from the body. Unfortunately Lubbock gives no distinctive structural characters except the relative length of the third antennal segment.

Templetonia cavernicola (Carpenter).

Pl. 2, figs. 2-5.

Sinella cavernicola, Carpenter (1).

do., (in part), Jameson (2).

As mentioned above, the discovery that this species is scaled (fig. 3) necessitates its removal from the genus *Sinella*. The ringed terminal segment of the antenna and the structure of the feet leave no doubt that it is a *Templetonia*, and closely allied to the type species *T. crystallina* (Müller), which is widespread throughout Europe.

In his figures of *T. crystallina* (*nitida*, Templ.), Tullberg (12) called attention to the remarkable deformation of the antennæ in certain specimens which had presumably been mutilated. The Mitchelstown species gives excellent illustration of this phenomenon. One of the individuals collected by Mr. Jameson had one normal five-segmented antenna; the other antenna had but three segments (fig. 1). Other specimens possessed antennæ with four segments (fig. 2). It is interesting to notice that the terminal segment is in all cases the longest and surrounded with rings of clubbed hairs; while in antennæ with less than five segments, it is proportionally longer than in those where the normal number is developed. Lubbock (4) calls attention to a similar phenomenon in *Tomocerus*.

In *Templetonia crystallina* there is a single ocellus on either side of the head situated on a pigmented eye-patch. In *T. cavernicola* no ocelli can be seen, but there are vestiges of the eye-patches in a few granules of brown pigment (figs. 1, 2). The feet of *T. cavernicola* closely resemble those of *T. nitida*, but the lower claw is more lanceolate and less linear in the cave-species. In my former description of this insect, I stated that the feet were destitute of clubbed hairs; I now find that while those of the second and hind pairs are furnished with long hairs ending in a fine point (fig. 5), the long hair on each front foot terminates in a very slender club (fig. 4).

A species of *Templetonia*, *T. major*, has been recorded by Moniez (5, 7) from mines and wells in the north of France, as well as under stones above ground, it also occurs in the Azores (6). It is larger than the other species of the genus and the upper claw of the foot has two teeth.

FAMILY LIPURIDÆ.

Achorutes armatus (Nicolet).

Mr. Jameson found three or four specimens of this species. In examples which occur above ground the surface of the body is, for the most part, covered with pigment. But in these Mitchelstown insects the amount of pigment is reduced, appearing in scattered spots on a white ground.

***Lipura Wrightii* (Carpenter).**

L. stilicidii, Wright and Haliday (13).

I have referred in my introductory remarks to the discovery of a post-antennal organ in this species—the dominant and characteristic insect of Mitchelstown Cave. The organ is harder to make out than in other species of *Lipura*, but it can be seen in most specimens, after treatment with caustic potash has rendered the head transparent. I have figured the organ in its position on the head (fig. 16), and given a more highly magnified sketch (fig. 17) of an example with fifteen prominences. Some examples have as many as eighteen. Between the organ and the antenna are three ocelliform punctures (fig. 16).

In *Lipura inermis*, Tullberg (= *L. simetaria*, Lubbock) there are fourteen prominences in the post-antennal organ and two ocelliform punctures. In *L. stilicidii*, Schiödte, from the Adelsberg cavern, Carniola, there are also fourteen prominences, but there are three ocelliform punctures as in *L. Wrightii*. Since my former paper on the Mitchelstown Cave fauna, the Dublin Museum has received specimens of *L. stilicidii* from Prof. Hamann, of Steglitz. Examination of these leaves no doubt that the structures described and figured by Schiödte are the prominences of a post-antennal organ, as Tullberg and Lubbock suggested, and not ocelli. Both our Mitchelstown species and *L. stilicidii* are therefore truly referable to *Lipura* and not to *Anurophorus*, which, in its modern sense, is restricted to *A. laricis*, Nicolet, a species with ocelli, but no post-antennal organ.

L. Wrightii can no longer be differentiated from *L. stilicidii* by the absence of a post-antennal organ, and it is seen that this structure differs but very slightly in the two forms. Both species have a strongly granular skin covered with bristles. In our specimens of *L. stilicidii* I find two stout spines on the last abdominal segment. These spines are absent in *L. Wrightii*. Those present in the Adelsberg species are much smaller than the prominent anal spines characteristic of *L. ambulans* and other *Lipurae*, and according to Schiödte's figures copied by Haliday (13) they disappear in perfectly adult specimens.

Both in *L. stilicidii* and *L. Wrightii* the apex of the third antennal segment bears a number of stout curved spines (fig. 18). I have found similar but smaller structures in a corresponding position in *L. ambulans*. I can find no mention of these in the literature, and have no idea of their function. Moniez, however (8), states that the apex of the second antennal segment of a French cave-species, *L. cirrigera*, bears a tuft of cirrhi which he believes to be some special adaptation to cave life. Beyond the obvious fact that it is some kind of sense-organ, the function of the post-antennal structures is also unknown.

It is certain that I was mistaken in describing the back margin of the head of *L. Wrightii* as sinuate, as well as in supposing the pronotum to be indented on either side. In the latter error I seem to have followed Haliday; it is some consolation to have made a mistake in such excellent company. I was deceived by the lateral projections of the thorax in the first segment, as Schiödte seems to have been in all the segments. I have figured (fig. 16) the head and two first thoracic segments as they really are, and in *L. stilicidii* they are closely similar.

Anurida granaria (Nicolet).

A few examples of this species were among Mr. Jameson's specimens of *Lipura Wrightii*. It is a white species, found somewhat rarely under stones. The genus *Anurida*, Laboulbène, in which it is now placed, is characterised by the circular arrangement of the prominences of the post-antennal organ. Moniez (5) states that this species has been drawn up in well-water in France.

In my previous paper on the Mitchelstown cave fauna, I drew attention to the apparent similarity of cave-insects in widely-separated localities, and ventured to suggest the possibility that the identical surroundings might have induced the independent development of similar forms in Europe, Ireland, and North America.

I have now been able to compare the Adelsberg and Mitchelstown species of *Lipura*, and find the differences between them even less than was before supposed, and that they are so closely allied, as to be hardly separable. It is evident that my "*Sinella cavernicola*," being really a *Templetonia*, can have no close affinity with *Entomobrya cavernarum* (Packard) from the North American caves. I find, however, that Moniez has pointed out the close similarity of his *Seira cavernarum* to that species of Packard's. Of course *Seira* has scales and *Entomobrya* has none, but Moniez, finding the difficulty of seeing the transparent scales on these white cave insects, thinks it possible that Packard may have failed to make them out, and the form of his insect seems to suggest a *Seira* or a *Cyphoderus* rather than an *Entomobrya*. I have already dwelt on the apparent similarity between the Mitchelstown *Cyphoderus Martelii* and *Seira cavernarum*, and it is interesting to notice that in Packard's species the lengths of the antennæ vary inversely as the depth of the caves where the specimens occur, thus bridging over one of the differences between the Mitchelstown and the French species. It is to be hoped that further explorations of our caves may throw more light on this most fascinating problem of the possible multiple origin of identical species.

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EXPLANATION OF PLATE 2.

Fig. 1. *Templetonia cavernicola*.—Head from above, showing one five-segmented (normal), and one three-segmented antenna. Magnified.

2. Do., Head from side showing a four-jointed antenna. Magnified.

3. Do., Scale from back of abdomen. Highly magnified.

4. Do., Foot of fore-leg. Highly magnified.

5. Do., Foot of hind-leg. Do.

6. *Cyphoderus Martelii*.—Magnified.

7. Do., Scale from back of abdomen. Highly magnified.

Fig. 8. *Cyphoderus Martelii*.—Foot of fore-leg. Highly magnified.

9. Do., Foot of hind-leg. Do.

10. Do., End of spring, showing extremity of dens and mucro. Highly magnified.

11. *Smynthurus coccus*.—Magnified.

12. Do., Terminal segment of antenna. Highly magnified.

13. Do., Foot of second leg. Highly magnified.

14. Do., Spring from above. Magnified.

15. Do., Mucro of spring from side. Highly magnified.

16. *Lipura Wrightii*.—Head and first two thoracic segments. Magnified. On the left side of the head are shown the antenna, post-antennal organ, and three ocelliform punctures; on the right side the mandible is seen in position, with the tip of the left mandible.

17. Do., Post-antennal organ. Highly magnified.

18. Do., End of third antennal segment. Highly magnified.

19. Do., Maxillæ. Magnified.

20. Do., Foot. Highly magnified.

OBITUARY.

MISS E. J. KELSALL.

It is with deep regret that we record the death of Miss Kelsall which took place on June 28th, at her residence, Blackrock, Co. Dublin. The deceased lady was the daughter of the late Colonel Kelsall, and was born in 1832. She was one of the original members of the Dublin Naturalists' Field Club, and up to the time of her last illness, she continued to take a deep and active interest in the welfare of that Society. For many years she served on the Committee, and she was most regular in her attendance at the meetings and excursions of the Club. Miss Kelsall was a good field botanist and an ardent horticulturist; she observed closely the animals frequenting her garden, and among the worms found by her was a planarian which has been pronounced new to science by the highest continental authority on the group. Her loss is mourned by a wide circle of friends, and not least by the members of the Dublin Field Club whose interests she had so much at heart.

WILLIAM ARCHER, F.R.S.

As we go to press we are grieved to learn the death of the late librarian of the National Library, one of the most eminent of Irish men of science. We hope to publish next month an account of Mr. Archer's work by his lifelong friend, Dr. W. Frazer.

PALUDESTRINA [HYDROBIA] JENKINSI, SMITH.

A NEW IRISH SHELL.

BY LIONEL E. ADAMS, B.A.

WHILE at Ballycastle last May, Mr. R. Welch, of Belfast, showed me some shells he had taken in 1893, and also with Captain Farrer in 1896, from my old hunting-ground at the mouth of the Bann, among which were some individuals of an extremely interesting species, and one new to Ireland, viz. :—*Paludestrina* (or *Hydrobia*) *Jenkinsi*.

Apart from its being an addition to the molluscan fauna of Ireland this species has an exceedingly interesting history, as I hope to show.

In the year 1889, Mr. Jenkins found a colony of shells on the bank of the Thames near Plumstead, which did not appear in any of the text-books, and which were quite unknown to himself and his conchological friends. Accordingly he sent a series to the British Museum, where Mr. E. A. Smith pronounced the species not only new to Britain but also to science. However, after seeing a greater number of individuals, Mr. Smith is not certain that the shell is not identical with a West Indian species, *Paludina crystallina* of Pfeiffer, and Canon Norman is decidedly of this opinion. Mr. Smith points out, however, that the threadlike keel round the whorls of some individuals of our British species differs from the carination of Pfeiffer's *P. crystallina* var. *coronata*, which consists of a row of spines forming a corona-tion rather than a carination.

In 1891, I came across the shell in dykes at Sandwich, and in that year also, under the guidance of the Rev. J. W. Horsley, I visited the Plumstead locality; and the next year, with Mr. C. Oldham, of Manchester, I took it in considerable numbers in a small tributary of the Exe, below Exeter, near Topsham. It then occurred to me that in several respects the three localities were similar, and I gathered the following facts. Both Sandwich and Topsham were of considerable importance as trading ports until, roughly speaking, two hundred years ago, when from different causes both subsided in favour of their respective sisters, Dover and Exeter. Two

men-of-war, which afterwards fought against the Armada, were built near Topsham on the very spot where *P. Jenkinsi* now flourishes. They must have been vessels of very small draft to have navigated the Exe at all, though the river may have been deeper then. Between 1840 and 1855 there was a regular trade between St. Petersburg and Finland and Topsham in timber, &c., but this trade ceased some twenty years ago, the timber being now unshipped at Exmouth, and sent to Exeter by rail or canal.

Sandwich, too, in former times, imported timber from the Baltic, as well as from other places, and this trade continued till quite recently, when the improved harbours of Dover and Ramsgate killed it. Along the south bank of the Thames timber has been unloaded from the Baltic, and other places, from time immemorial.

Now, the fact of the same foreign locality exporting timber to three different British ports (the only known habitats (then) of the species in question), and that same foreign locality being the only one, so far as I have been able to ascertain, trading mutually with two out of the three seemed a curious coincidence, and one which formed a plausible hypothesis. I ascertained that Newhaven and Wisbech also imported timber from the Baltic, and I suggested that search should be made there. I made two excursions to Wisbech and neighbourhood, but I had very little time to search the far-extending dykes thoroughly, and I failed to find it. However, in 1894, Mr. C. H. Morris, of Lewes, found an exceedingly abundant colony at Newhaven. Curiously enough Mr. Morris and several others had worked the locality for several years, and had never met with it before. Hearing that Baltic timber was still unloaded at Rye, I searched for the shell there, but my limited time again prevented me from investigating the many miles of dykes that intersect the plain round that charming old Cinque Port. However, I did find it close by in the Military Canal at Hythe, which is joined to the Rye dykes by sluices in several places. In 1893, Mr. A. T. Daniel, of Stoke, found a thriving colony in a Staffordshire canal, near Dudley, which was the first inland locality noticed; but I have been unable to obtain any information respecting this spot, though probably there is a timber wharf not far off.

And now Mr. Welch makes the further interesting discovery of the shell in Ireland, and he has ascertained for me that three firms import Baltic timber at Coleraine, and that a considerable amount was used for the Bann-mouth Extension works.

In 1883-1884 I did a good deal of collecting in this locality, and I fancy I should have remarked the shell if I had come across it, as it was then an unknown form.

Such, briefly, is the history of this species, and the following points are suggested:—

Had the shell come from Norway, Sweden, or Prussia, it is likely that it would have been discovered ere now by some of the keen investigators of those countries, but it is not so likely that conchologists have wandered along the low-lying shores of Russia and Finland, which shores, from personal knowledge, I can testify to being extremely desolate and difficult to traverse. These shores have large inlets and brackish marshes where the timber is stored previous to shipment, and I imagine it is from these places that the shell comes. Of course it may be indigenous to the British Isles but in that case it is difficult to account for its having escaped the notice of the numerous conchologists, who for the past forty years have made many of its habitats their favourite hunting-grounds; the Staffordshire canal and the mouth of the Bann being the only habitats that have been little worked.

In my "Collector's Manual of British Land and Freshwater Shells" I have figured the shell and discussed its alleged identity with the West Indian species, but even if this identity turns out a certainty, another question arises. Is it indigenous to the West Indies, or was it imported there in Baltic timber?

Of course it remains to be seen whether it exists on the shores of the Baltic, for it must be remembered that its existence there is merely based upon a hypothesis, which, however, seems probable.

THE BORDERLAND OF EUROPE.

On the Origin of the European Fauna. By R. F. SCHARFF, PH.D.
Proc. Roy. Irish Academy (3), vol. iv., no. 3, 1897. Price 1s. 6d.

It is difficult for anyone other than Dr. Scharff himself to review this remarkable paper. I have sought to avoid fate by flight; but the work still remains within my hands. With the actual connivance of the editors, I write in the far north, away from books, and in contact with primæval Ireland. A peasantry, clad in the simple brilliance of old days, in scarlet and green, orange and tawny brown, moves through the market beneath the windows, and carries the mind a century from Dublin or Belfast. To the north rises the gneissic moor of east Tyrone, one of the oldest backbones of the country, swept this day with cloud-drift, and chill with August rain. And here I am directed to sit me down and discuss the European fauna.

The appropriateness, however, lies in this: Dr. Scharff centres his argument in ancient Ireland, and shows how the distribution of life-forms in this island may be used as an indication of their successive advent into Europe. His main thesis is that what he styles the eastern or Siberian element in the British fauna does not occur in Ireland; some members of this Siberian fauna occur in the East-Anglian Forest-bed; and the same fauna in Europe at large is posterior to the Lower Boulder-clay. Hence the Forest-bed is Postpliocene, while some part of the British Pliocene is contemporaneous with the Lower Boulder-clay of Europe. At or soon after the period of the Forest-bed, on the above evidence, Ireland was cut off from England and from Scotland. But the Arctic and southern elements of the fauna of our islands both occur in Ireland; hence they must have arrived prior to the deposition of the Lower Boulder-clay of Europe, and must have survived the glacial epoch in the area in which they are now found.

This, I take it, is the principal contention of the present paper; but its eighty pages are full of valuable information, and of new light thrown upon facts which have been elsewhere set before us. Much of our knowledge of the Irish fauna, from the point of view of distribution, will be found to be due to recent researches, and notably to those of Dr. Scharff himself. The encouragement given by the Field Clubs and by the *Irish Naturalist* to individual observers is certain to bear further fruit; but it seems doubtful if the central facts, the absence of the Siberian fauna from Ireland and the date of its spread across Europe, can be shaken by future observations.

Dr. Scharff at the outset makes light of the supposed accidental or artificial introduction of species into Ireland, and argues that the present fauna contains 95 per cent. of species (p. 434) which are sound for the purposes of his zoo-geological argument. This fauna, it is only reasonable to suppose, migrated from Europe—if it did migrate at all—across dry land. Whatever point of view we may take, a land-connexion, on and off through Cainozoic times, existed between our isles and the continent of Europe.

Now, here comes the possible difference of view between the geologist and the zoologist. The latter, arguing from his most natural study, distribution at the present day or in very recent deposits, concludes that a species arose near its position of maximum abundance. For some reason or other, moreover, the fact that the British Isles are islands now-a-days, has made everyone ready to speak of the migration of forms into those islands. The origin of European species within the area of the British Isles, and their migration outwards when local conditions became less favourable for their multiplication, are possibilities that seem too often disregarded. Yet the geologist must see in the western border-lands of modern Europe a diminished continent from which land-animals must have again and again moved eastward. The south-eastern sea, at one time a series of gulfs, at another a swelling ocean, has been a phenomenon of such frequent recurrence and of such amazing geological antiquity, that even at the present day one may be chary as to landed investments in the East. Species of Carboniferous labyrinthodonts may have originated in Kilkenny; mammals may have arisen at Bristol independently of their South African relations; the land-fauna of Jurassic and of Cretaceous times must have been thrown far westward by the spread of the eastern ocean, and must have gone on flourishing in the hills of Donegal and Connemara. The mammals of Eocene times are best known from French deposits; but they must have found a broader ground for exercise in the dry land that stretched continuously where our western isles at present stand. In middle Miocene times, during the Helvetic age, there must have been a veritable huddling together of the land-fauna towards Great Britain; the crowding would lead to fiercer competition, the keener processes of selection would lead to the origin of species. Hence geologists may fairly be unwilling to look on our isles as barren lands waiting to be peopled in Pliocene or later times. Far rather has the breaking up of a broad land-area along the present continental edge sent our land-fauna to the new steppes that opened eastward, leaving us a mere diminished remnant to struggle with the glacial epoch.

The rich terrestrial population here suggested would leave, however, scarcely any traces in our own Cainozoic strata. It is only in fortunate pockets, as it were, in the river-swept lands of Europe that any number of mammalian remains have been preserved. To this day, the little digging on the farm of Pikermi, and the local deposit of Mont Lébéron, are our chief storehouses for the land-fauna of the lower Pliocene in Europe. The richness of these deposits, however, points to an abundance of individuals across the continent. In our own area, the enormous denudation that accompanied the glacial epoch, whether we regard swollen rivers, or marine currents, or even moving ice-sheets, as the agent, would effectually sweep away the larger part of our previous land-deposits, some of which may have dated back to Eocene times. How much is now buried under "drift" is quite uncertain; but it is improbable that any recognisable deposit can remain. It required half the plateau-eruptions of Antrim to preserve the only Cainozoic land-

remains with which we are acquainted in Ireland, prior to the Glacial epoch ; and even these land-remains, as we may fairly say in this country, are lacustrine.

All this is here put forward as showing that geologists, if allowed a loop-hole, will be anxious to claim the British area as a breeding-ground for the European fauna. And Dr. Scharff, by arguing that the fauna was not extinguished in Ireland by the glacial epoch, provides a loop-hole of some magnitude.

The discussion of the climate and physical geography of Europe during the glacial epoch is one of the most valuable features of the paper. Anything that keeps open the position maintained by Lyell and others, that extensive glaciation is compatible with mild and sheltered nooks and corners, and that much of the distribution of boulder-clay was performed in seas and not on land, may be welcomed by rationalists, at any rate until further research has been carried on among the Arctic glaciers. At present, every year brings evidence of modern marine boulder-clays in high latitudes, and removes us farther and farther from belief in a *moraine profonde*. Dr. Scharff, for example, in his extensive reading, has not overlooked the recent observations of Captain Feilden (p. 475); and Mr. Russell's description of the forest growing on the ice of the Malaspina glacier would also have provided him with a useful argument.

The absence of marine organisms from the Russian boulder-clay is met by the suggestion (p. 464) of "a persistent current, carrying icebergs, laden with detritus in an already turbid sea." But these conditions must have prevailed in almost any region where boulder-clay was forming under water ; and the explanation must be regarded as tentative. The difficulties surrounding the discussion of glacial questions are admirably illustrated on p. 492, where Dr. Scharff's remarks are not only edifying, but exhilarating :—"A number of land and freshwater shells are quoted by Prof. J. Geikie from the Arctic freshwater bed on the coast of Norfolk, in evidence of a rigorous climate. These are spoken of by him as high northern forms ; but in this he is mistaken. Everyone of them are inhabitants of Ireland at present, and all but one very common."

While Dr. Scharff does much to explain away the evidence in favour of an arctic climate in our islands, we may remember that the tables can be turned, and that the puzzle as to the Hippopotamus and Spotted Hyæna (p. 486) may be solved by supposing that, of a large number of such individuals subjected to a temperate climate, a sufficiently large number may be found capable of surviving and perpetuating the race. This, by the by, is only what happens when we send young men from our Universities and Staff-colleges to compete with natives in India.

When we come to old sea-barriers, and land-connexions now submerged, we are still largely in the region of hypothesis. Dr. Scharff treats candidly, yet firmly, the supposed connexion between Europe and America, by way of Spitsbergen (maps on pp. 461 and 466), and seems to regard Mr. Carpenter's suggestion of a dual origin of certain species as still beyond the range of probability (p. 476). But Cope argued for the dual ancestry of so complex a creature as the horse

—to admit which would be to deal an almost treacherous blow at our masters in the study of animal distribution. The land-connexions asked for are not only possible, but geologically probable; but there is no real reason for making the barrier between the North Sea and the Atlantic end oft, as is here done, at or about the 100 fathoms line. Any western extension, if drawn, would certainly be guesswork; but it would make the proportions of land and water on the map more akin to those of a region undergoing elevation on the west and depression on the east. Dr. Scharff quotes Mr. Maxwell H. Close and Prof. Bonney (p. 494) in support of a greater elevation of the west coast of Ireland in recent times; but it is not made clear that such elevation is not likely to have occurred *en bloc*, as an uplift of the present continental edge. I am aware that map after map has been drawn in various works upon the basis of some such supposition—a supposition opposed by the variable heights of raised beaches or old sea-terraces on the actual margins of our continents. Even the remarkable hollow between Stranraer and Larne (p. 439) may be due to recent warping, and may have had no existence until the glaciers melted from our steadily subsiding shores.

I feel that I have dealt unfairly by the mass of facts brought together in this memorable paper in pointing out the wide field for favourable or unfavourable hypothesis. Even where Dr. Scharff speaks with decision, he may underrate the equal decisiveness of the other side. Though personally I cordially agree with him as to the indications of subsidence at Moel-y-Tryfaen and Three Rock Mountain (p. 498), it must be remembered that the advocates of ice-sheets are prepared to scoop cubic miles of material out of the sea. Even if we do not grant this as the simplest explanation, yet we cannot easily limit the area over which land-ice has existed in Ireland (p. 494). The almost level ice-filled centre, resembling the Malaspina glacier of Alaska, with local glaciers descending from the hills would leave little of the country, as we now know it, uncovered by solid ice. But these glacial conditions were probably dependent on considerable continental uplift to the west. In the low-lands bordering on the old Atlantic ocean, Dr. Scharff may find ample refuge for the pre-glacial fauna, concerning which he has argued so logically and consistently. As the land fell, as the great "piedmont" glacier melted, as the esker-drift appeared, brown and barren, from beneath it, the colonisation of the region known as Ireland began—a region that probably represents only a portion of a tract of plains and mountains once teeming with Cainozoic life.

As I close this comment—in place of a review—the sun streams across a land of mingled eskers, grown with grass and heather, and turns to gold the last relics of the glacial lakes. In such a scene, the "revolution of the times" seems very near us; and Dr. Scharff's paper, rising from the realms of learned disquisition, appeals to us direct as naturalists, speaks to us through the Ireland that we know.

GRENVILLE A. J. COLE.

THE HYDROIDS OF VALENCIA HARBOUR, IRELAND.

BY EDWARD T. BROWNE,
(University College, London).

In the *Irish Naturalist* (May, 1896), there is an article "On Shore-collecting and Dredging" in Valencia Harbour by my friend and colleague, Mr. F. W. Gamble. In that article Mr. Gamble gives the names of the Hydroids which were found in the harbour, but the identification of the species was done by myself, though most of the specimens were collected by Messrs. Gamble and Beaumont. The name of *Coryne pusilla* must be withdrawn from the list, as a subsequent examination of the specimens show they are not to be distinguished from *Coryne vaginata*. A second visit to Valencia Harbour was made last year (1896), and a few more species were found. It is my intention to give now a list of all the Hydroids which we found, and a brief description of some of the specimens.

From the situation of Valencia Harbour, its large area, its sheltered position, and the varied nature of its shores, it would be expected to yield a considerable hydroid fauna. The tow-net captured several species of Medusæ which are known to be derived from hydroid colonies, but the Hydroids themselves we failed to find, though much dredging and shore-collecting were done, especially during our second visit, when we had a sailing-trawler for dredging in the deeper water outside the harbour. The Hydroids turned out to be poor in the number of species and below the average compared with the other groups of animals, and only a few species were found in abundance. To judge from the abundance of certain species of Medusæ there must exist colonies of Hydroids, covering large areas, not far from Valencia, but the frequent dredgings did not reveal to us their grounds. The absence of certain Hydroids, though their Medusæ may be abundant, I have noticed in other localities. It appears to me that a distinct hydroid fauna probably lives upon rocks lying in a moderate depth of water not far from shore. Such places the dredger avoids as much as possible from the fear of tearing the net or losing the dredge.

The finding of *Rhizogeton fusiformis* is of great interest, as I do not think that a specimen of this genus has been recorded before for Europe.

For the notes on *Tubularia* I am mainly indebted to the Misses Delap. To the Rev. A. Delap, the Rector of Valencia, and his family we are greatly indebted not only for their kind hospitality, but also for valuable information relating to the marine fauna of the district.

I. GYMOBLASTIC HYDROIDS.

(Allman. 1872. Monograph of the Gymnoblastic Hydroids.)

Clava multicornis (Forskal).

A single colony growing upon a stone was found near low-water mark. The gonophores contained ripe ova and formed a broad ring round the hydranth immediately behind the proximal tentacles. The hydranths were about 4 mm. in length, with whitish tentacles. The endoderm cells of the hydranth and of the spadix of the gonophores were of a blackish colour. July, 1896.

Clava squamata (Müller).

A few colonies found attached to sea-weeds growing near low-water mark. All the colonies possessed gonophores which showed considerable variation in colour. The gonophores are usually of a reddish colour, but in some of the colonies the gonophores were of a purplish colour, or even bright blue. The purple and blue colours were only present in mature gonophores. The unripe gonophores were of the usual reddish colour. April, 1895.

Coryne vaginata (Hincks.)

This species was fairly common in the harbour, attached to sea-weeds or to the sides of rock-pools.

There are two well marked forms of this species. The one is characterized by its length, and agrees with the description given by Allman. It is usually two or more inches in length, and connected with the stolon by only a few stems; sometimes only one long stem is present. The tendency of the colony is to grow in length, and it is usually attached to the side of a rock-pool. The other form makes a close, compact colony, usually attached to sea-weeds along which the stolon ramifies and gives off numerous stems. In general appearance it resembles *Coryne pusilla*, but not in detail. The gonophores are situated in the axils of the tentacles, and the perisarc of the stem extends to, or nearly to, the lowest tentacles. In these points the Hydroid may be distinguished from *Coryne pusilla*, in which the perisarc does not send off a

sheath upon the base of the hydranth, and the sporosacs are developed among the tentacles from the body of the hydranth. In the compact form of this species the extension of the perisarc to the base of the hydranth is not always visible, owing to its thinness and its closeness to the ectoderm of the hydranth. But the existence of this extension may be easily demonstrated by placing a part of the colony in dilute potash for a short time, and then removing the hydranth. To the naked eye these two forms appear to be distinct species, especially when the extremes of each kind are compared. The presence of the gonophores in the axils of the tentacles and the extension of the perisarc to the base of the hydranth show that they belong to the same species. The difference in the form of the colonies is probably due to their situation, as the compact colonies are usually found growing on sea-weeds, and the long colonies attached to stones or the sides of rock-pools. May, 1895.

***Eudendrium ramosum* (Linn.)**

A small colony, about $1\frac{1}{2}$ inches in length, with male gonophores, was dredged in the harbour. August, 1896.

***Hydractinia echinata* (Fleming).**

Fairly common in the harbour growing on shells inhabited by hermit crabs.

***Myrothela phrygia* (Fabricius.)**

Fairly abundant on Church Island, and near Murreagh Point. It lives near low-water mark, attached to stones.

***Rhizogeton fusiformis* (Agassiz).**

The genus *Rhizogeton* possesses only one species—*R. fusiformis*—which has hitherto only been found in Massachusetts Bay, U.S.A.

During our visit to Valencia Harbour in April, 1895, Mr. Beaumont found several colonies of this Hydroid living on the under side of stones, near low-water mark, on the shore near Knightstown. The Valencia specimens do not agree in every detail with the species described by Agassiz, as the following description shows:—

The trophosomes and the gonosomes are situated at irregular intervals upon a creeping stolon which is closely and irregularly branched. The lower half of the hydranth is covered by a perisarc which at the base is conspicuous by its being covered with brownish particles, forming a kind of collar about half a millimetre in width, and the upper portion of the perisarc is clear, very thin, and difficult to see. The hydranth is about 2-3 mm. in length and about $\frac{1}{2}$ mm. in width.

It carries about 20 long tentacles which are situated upon its distal half. The gonosome, like the trophosome, is also situated upon the stolon. It is 1-2 mm. in length and completely covered by a very thin and delicate perisarc. The gonophore is oval in shape, and is situated upon a peduncle so that the gonosome appears club-shaped. In mature specimens the ova were seen free inside the gonophore. The general colour of the colony is pinkish. All the colonies were situated upon a dead polyzoon (? *Membranipora*) which had encrusted the stones.

The hydranth of the American *Rhizogeton* is about 3-6 mm. in length, with about 12 tentacles. The perisarc extends nearly to the base of the tentacles. The colony is of an orange colour. The hydranth of the Valencia specimens is, therefore shorter, but carries more tentacles. It shows also a difference in colour.

Tubularia indivisa (Linn.)

Colonies taken in Doulus cave by the Misses Delap. May, 1897. Actinulae visible inside the gonophores.

Tubularia larynx (Ellis and Solander.)

One of the commonest Hydroids in the harbour, where it lives attached to the bottom of boats. Anchored in the harbour were two large old hulks used for storing ice, and during our visit they were beached for repairs, and also a smaller hulk used for storing coals. The bottoms of these hulks were completely covered with barnacles, ascidians, and *Tubularia larynx*. A large number of nudibranchs, chiefly *Dendronotus arboreus* and *Eoia lineata*, were feeding upon *Tubularia* and they partly accounted for the great masses of old stalks, as the number of hydranths in each cluster was small compared with the number of headless stalks. The clusters of *Tubularia*, often four to five inches in height, were not formed by the growth of a single colony, but by a succession of colonies. The young actinulae settling down upon the stems of the old colonies, which had died away or been eaten by the numerous nudibranchs. In some places on the hulks the old stems only remained, forming a thick matted mass upon which polypoa were growing. *Tubularia larynx* was only found on the bottom of the hulks, small boats, and buoys, which had been some time in the harbour. It was not seen upon the shore between tide marks, nor dredged. A small boat which had for some time been at the bottom of the harbour in a few fathoms of water was recovered and beached during our visit. I examined the boat soon after it was hauled ashore and found it completely and solely covered with thousands of specimens of *Lipas Hillii*. Not a single Hydroid was seen; even *Ascidia aspersa*, common in the harbour and on the bottom of the hulks, was also absent.

Although this species was confined to the bottom of boats and other floating objects, yet the shape of the colonies showed considerable variation, extending from a close, compact colony with stems less than an inch in length, to straggling colonies from three to four inches in length.

In some of the colonies the stems are straight and slender, in others greatly contorted and twisted. The stems are only branched close to the base, and vary in thickness in the different colonies. The annulation of the stems is also very variable, in some colonies quite smooth, except at the base, in others the annulations occur at irregular intervals.

The stems in some of the specimens have the appearance of being branched at intervals, but a close examination shows that the branch formation is due to the attachment of the actinulae liberated from the

gonophores, and the subsequent growth of their stems to nearly an inch in length. The distinction between a true branch and the attachment of another Hydroid to the stem may be easily recognised, as the cœnosarc is not connected in the latter case.

The hydranth is pinkish with white tentacles. The gonophores are on branched peduncles and crowned with four conical tentaculiform tubercles when mature, but not in the early stages. The spadix of the gonophores is of a brilliant dark red colour.

The growth of a colony is fairly rapid. A sailing boat, belonging to the Rev. A. Delap, was launched on the 27th of April, 1896, and on the 1st of July actinulæ were present in the gonophores of a fair-sized colony. Large colonies, 3-4 inches in length, were taken from the same boat on the 12th of August, when it was hauled up for cleaning. On the 6th of October the boat was again brought ashore. Miss C. Delap informed me that the bottom of the boat was almost completely covered with *Tubularia*, and some of the colonies measured $2\frac{1}{2}$ inches in length. The barnacles (*Lepas anatifera*) measured from 2— $2\frac{1}{2}$ inches in length, and two of the specimens sent to me by Miss Delap had Hydroids growing upon them. On one was a colony of *Tubularia larynx* attached to the peduncle, about an inch in length, with actinulæ in the gonophores, on the other a fine colony of *Clytia Johnstoni*.

Darwin in his book on Coral Reefs (3rd. Edit., 1889, p. 106), gives the following note on the growth of *Tubularia*:—"The anchor of the 'Beagle,' in 1832, after having been down exactly one month at Rio de Janeiro was so thickly coated by two species of *Tubularia*, that large spaces of the iron were entirely concealed; the tufts of this horny zoophyte were between two and 3 inches in length."

II.—CALYPTOBLASTIC HYDROIDS.

(Hincks, 1868, British Hydroid Zoophytes.)

Antennularia antennina (Linn.)

On shells dredged in the harbour.

Antennularia ramosa (Lamarck).

Common on shells dredged in the harbour.

Campanularia flexuosa (Hincks.)

Common on sea-weeds near low-water mark. April, 1895.

Planulæ seen inside the gonothecæ. July, 1896.

Clytia Johnstoni (Alder.)

A fine colony with gonophores growing on *Lepas anatifera*. October, 1896.

Haleclum Beanii (Johnston).

A colony bearing gonophores dredged in the harbour. May, 1895.

Obelia geniculata (Linn.)

Colonies with gonophores growing along with *Clytia Johnstoni* on *Lepas anatifera*.

Sertularia polyzonias (Linn.)

A small colony found in a rock-pool.

Sertularia cupressina (Linn.)

A single colony dredged in the harbour. May, 1895.

Sertularia operculata (Linn.)

A single colony $2\frac{1}{4}$ inches in length.

Sertularia pumilla (Linn.)

Common on *Fucus* between tide marks.

The Medusæ belonging to the following Hydroids were taken in the harbour, but the Hydroids were not found:—*Bougainvillia*, *Clavatella prolifera*, *Corymorphia nutans*, *Hybocodon prolifer*, *Lar sabellarum*, *Perigonimus*, *Podocoryne*, *Zygodactyla*, *Syncoryne*.

PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include freshwater fish from Major Gamble, a Silver Pheasant from Mr. H. M. Smith, and a pair of White Herons from Dr. C. B. Ball. Three Capybaras have been born in the gardens, a Lioness has been obtained in exchange, while a kangaroo, seven Sheldrakes, ten Puffins, and three gulls have been bought.

Upwards of 20,800 persons visited the gardens during July.

DUBLIN MICROSCOPICAL CLUB.

JUNE 17.—The Club met at the house of Mr. F. W. MOORE, who showed portion of the posterior sepal of *Cirrhopteridium fimbriatum*, an Indian epiphytal orchid. The edges are elegantly fimbriated, and it was shown that these fimbriations were not mere trichomes or out-growths of the epidermal cells, but that they were caused by irregular growth of the tissues of the edges of the sepal.

Mr. GREENWOOD PIM showed the aecidial stage of *Puccinia graminis* on Barberry leaves collected at Avondale, Co. Wicklow. The uredo and teleutospore forms of this fungus (wheat rust) are exceedingly common, but the cecidiospores are much rarer, the Barberry on which they occur being far from common in Ireland.

Mr. M'ARDLE exhibited a proliferous form of *Jungernania barbata*, Schmidel., which he collected recently on Brandon Mountain, Co. Kerry. The specimens showed various stages of adventitious budding, which first appears on the leaves; a few cells are conspicuous by their dark green colour. Closer examination shows them to be copiously nucleated, and from rapid cell division a protuberance soon arises from the tissue of the leaf which is but one cell thick. As growth continues

they become more prominent and surrounded with a hyaline ring ; and in later stages the buds are divided by transverse or longitudinal septa, and root-hairs are developed. At this stage the connection with the parent plant becomes very limited, and finally they fall off, and under favourable circumstances reproduce the plant. It may be of interest to note that this mode of reproduction is not to be confounded with the gemmæ borne in groups on the apex of stems in *Kantia*, *Cephalozia denudata* and *Jungermania ventricosa*, &c., but, like those of *Sendtnera juniperina*, described by Dr. R. Spruce, *Phytologist*, vol. ii., 1885, p. 85, and Mr. M'Archie's own description, *Irish Naturalist*, vol. vi., 1895, late 3, of *Lejeunea serpyllifolia*, they invariably form plantlets with stem and leaves before being separated from the parent plant.

Prof. T. JOHNSON exhibited a preparation of *Comatricha Persoonii*, Rost., a slime-fungus found among dead leaves. The preparation was one of a set of specimens, illustrating nearly a hundred species of the British Mycetozoa (Myxomycetes or Slime-fungi) recently presented to the Botanical Collections of the Dublin Science and Art Museum, by A. Lister, V.P.L.S., by whom the Catalogue of the group was prepared for the Trustees of the British Museum.

Mr. ALLAN SWAN sent for exhibition a mounted cultivation of *Cladothrix dichotoma*, and a species of *Achlya* which appears identical with de Barig's *Achlya polyandra*. These two forms were grown together on a cover glass cultivation for identification purposes ; *Cladothrix* appears with the very characteristic short rods and spores which have broken up from the long twisted filaments of earlier growth ; *Achlya* shows only the earliest stages of development, with no sign of spore-formation, and the protoplasmic contents of the hyphæ has been injured by drying. *C. dichotoma* is one of the commonest of fresh-water organisms, it flourishes whenever organic impurity is present, and if traces of iron be present in the water, its massed filaments have a marked red colour, which can be shown to be iron by the ferrocyanide of potassium test ; *Achlya* and allied forms of the Saprolegniæ are much more common in our water supplies than is generally supposed. The exhibitor has never failed to find them after a proper search. These two forms of life are generally to be found on submerged animal or vegetable matter in streams or ponds, but he has lately found them flourishing luxuriantly in air-exposed situations, with restricted water supply, and taking their nourishment entirely in the soluble form, from an impure water which was only sprinkled or bespattered over them, as they grew side-by-side on a perpendicular wall near a sewer grating. The identification of *C. dichotoma* is a simple matter as it is easily cultivated, and its characteristic red colour (which formerly caused it to be called *Leptothrixochracea*) can be shown to be an iron oxide. The *Achlya* forms by quite recent investigation are shown to be more numerous than were formerly supposed, for this reason the exhibitor is unable to identify the species, until he can consult the latest work on the subject. The form here shown is easily cultivated on flies, and its two forms of spores more readily produced, the zoospores are non-motile, and after liberation remain grouped at the mouth of the sporangia ; with

restricted nou rishment and air supply oospores were produced in about eight days, they were generally formed at the extremities of the hyphae and did not exhibit antheridia, the oospores are spherical and number from four to twelve, commonly four to six, thus resembling the commonest *Achlya* form of our open waters.

The massed growth of *Achlya* which was found on a wall near a sewer, was several inches in diameter and almost an inch thick, it was of a pale grey colour, and much resembled the fungus of salmon disease (*Saprolegnia frax*) as it appears on a fish after being taken from the water; microscopically examined the mass of filaments showed no sign of spore-formation, nor was any tendency towards protoplasmic thickening or granulation noticeable.

Mr. H. J. SEYMOUR exhibited a section of a spherulitic rhyolite or felsite from a dyke a few miles south of Newcastle, Co. Down. Under the microscope a large number of spherulites are seen, embedded in a crypto-crystalline ground-mass, which may have been once in a glassy state. Some porphyritic felspars also occur in the slide. The rock section was kindly lent by Miss M. K. Andrews, of the Belfast Naturalists' Field Club.

Dr. C. HERBERT HURST exhibited a microscope of simple construction adapted to be handed round in a class or meeting. The body of the microscope carries the objective and eye-piece as in an ordinary microscope. The tube in which it slides is enlarged at the lower end somewhat like the bell of a trumpet, and the slide under examination is held by a spring inside this bell. A metal lid with a small hole in the centre fits upon the bell, serving as a diaphragm, and at the same time protecting the slide from injury. A powerful screw-clamp prevents the body from sliding in the tube after it has been adjusted, and fine adjustment is accomplished by sliding the eye-piece. Those whose valuable slides have been destroyed by having the objective thrust through them by inexpert members of an audience will recognise the importance of this clamp. A large concave mirror inside the bell, and perforated at its centre for the objective lens, serves, when the diaphragm (or "lid") is removed, to illuminate opaque objects. The microscope when in use is simply held in the hand and directed towards the light. It gives excellent results even with high powers.

BELFAST NATURALISTS' FIELD CLUB.

JULY 31.—EXCURSION TO CRANFIELD POINT.—A start was made for Randalstown in the 9.45 train. Arriving there, the route was taken to the shore of the lake, passing the old Oak Cross, only the shaft of which now remains. The great quantities of Meadow-sweet in every field filled the air with fragrance, and helped to make the walk a pleasant one. Near the old church a small settlement of fishermen in their tents and booths gave quite a primitive air to the district, with their long double rows of pollan-nets hung out to dry, whilst scattered around were the fishermen baiting long lines, of 100 hooks each, for eel-fishing. The ingenious method adopted by the men to prevent entanglement was

noted, also the way in which the bait was kept fresh on the hooks, which were laid after baiting at one end of the flat basket on damp sand. Here the party scattered along the shores of the lake, bent on different pursuits, traversing the rich carpet of Harebells along the rocky margin. The botanists and geologists did fair work during the day. The former collected many of our gayest wildflowers. *Leonurus Cardiaca*, a rare labiate plant, was found growing spontaneously in a hedge and field at Cranfield. It is not, however, to be classed as a native, but as an escape from cultivation, it having been a medicinal plant of renown in the olden times. *Potamogeton heterophyllum* was found somewhat plentiful in the lough; and *Galium boreale* was abundant amongst the rocks on the shore. Here also grows *Hieracium auratum*, just coming into bloom now with *Rosa mollis*, *Circeaa alpina*, and several other plants of note. The geologists visited the plant-beds in the basalts of Eocene age which are exposed on the shore of the lough about half a mile west of the old church, and picked up some erratics, including Ailsa eurite (?) at various points along the margins, in the thin patches of gravel which only partly cover the surface of the basalt all round Cranfield Point. The shell-collectors found *Limnaea palustris*, *Planorbis marginatus*, and *Ancylus lacustris*, in all stages of growth, covering the rocks along the shores of the lake, whilst a colony of the rarer *Limnaea stagnalis*, much larger specimens than those in the lough, flourished in a little pond at Rabbit Point. The albino variety of *Bythinia tentaculata* occurred in several places in flood-material, quite fresh, though dead, with *Physa fontinalis*, and masses of the young shells of the wandering snail, *Limnaea peregra*, and a few *Pisidia*. The old church at Cranfield Point may be said to occupy the "point" itself, as the graveyard in which it stands forms a small cape on the north-west end of Lough Neagh. The church is a small rectangular ruin, measuring 42 feet 6 inches by 21 feet 5 inches, the height of the site being about 10 feet 6 inches on the inside, but nearly 3 feet less on the outside, owing to the gradual heightening of the graveyard. The gable walls of the east and west ends are in fairly good preservation—having received some attention from the Board of Works—but it was noticed that the Ivy is causing a very serious fissure to appear at the north-west groin, and unless its growth is arrested, will eventually undo the good performed by the Board of Works.

After some hours spent here a return was made to Randalstown, where a hearty meal was partaken of in Macaulay's comfortable little country inn. The 5.25 train was taken to Belfast, bringing back a party well satisfied with their visit to this out-of-the-way but enjoyable district.

NOTES.

BOTANY.

FUNGI.

A Big *Boletus*.

On a roadside near Stradbally, Queen's Co., last month I found a remarkably large *Boletus*. It stood 9 inches high, and the pileus measured 42 inches in circumference, and 18 inches in its greatest diameter. The stalk at its junction with the pileus was 13 inches in circumference. It was impossible to bring away such a gigantic specimen, but from my description Dr. M'Weney believes the species to have been *Boletus edulis*.

R. LLOYD PRAEGER.

HEPATICÆ.

A Check-List of British Hepaticæ.

We should like to draw the attention of botanists interested in the *Hepaticæ* to the convenient "Catalogue of British Hepaticæ," which Rev. C. H. Waddell has compiled for the Moss Exchange Club. The list is printed in the same style as the "London Catalogue of British Plants," and is intended to serve the same purpose—to facilitate exchanges and the cataloguing of collections. The classification is with some slight exceptions that of the late Dr. Spruce. A useful feature is the addition in italics after the names of many of the species, of synonyms by which the plants are better known to many collectors. This is, indeed, rendered almost necessary by the continual revision and alteration of plant names. The list is well printed on eight pages of good paper, and is published at 6d. by Messrs. W. Wesley & Son, 28, Essex-street, Strand.

PHANEROGAMS.

Enanthe pimplinelloides, Linn., in Ireland.

This rare and interesting plant, which hitherto has not been recorded from Ireland, except in apparent error, grows in some plenty at Tra-bolgan, Co. Cork, where I have seen it during the past two summers. It ranges in patches over a couple of acres of the extensive pastures close to the sea at that place.

Mr. Arthur Bennett, F.L.S., to whom my thanks are due, has kindly examined and identified my specimens.

The plant is one unlikely to have been introduced, and looks like a native, the habitat being similar to those in which the species occurs in the south of England; still, pending its discovery in other Irish stations, it will perhaps be safer for the present to regard it as "probably indigenous."

R. A. PHILLIPS.

Epiptaxis latifolia in Co. Dublin.

Mr. Joseph Meade sends a fresh specimen of this Orchid collected at Old Connaught. In his "Orchids of County Dublin" (I.N., iv., p. 195, 1895,) Mr. Colgan quotes Ballybetagh as the only reliable habitat for the plant in the county.

R. LLOYD PRAEGER.

ZOOLOGY.

INSECTS.

Bites of Telephorl.

In the March number of this journal, p. 86, Rev. W. F. Johnson, under "Insect Folk-lore," mentions the popular idea in certain rural districts that *Telephorus fulvus* is capable of inflicting a "very sore bite." I have never been bitten by this species, but some years ago, when collecting beetles in Co. Meath, I was rather sharply bitten by a specimen of *Telephorus pellucidus*. The insect succeeded in nipping me several times at the base of the second finger, drawing blood. And I remember well that its pointed mandibles were as sharp as needles. I am led by this experience to think there is some good foundation for the rural idea.

H. G. CUTHBERT.

Abundance of Vespa austriaca, Panz.

For several weeks in July (July 1st to 20th) I have noticed an unusual abundance here (Blackrock, Co. Dublin) of these wasps. I captured ten specimens in the garden, hovering about the bee-hives. All are females, the males being unknown, or unrecognized, so far, in the British Isles. *Vespa rufa*, L., a wasp closely resembling *austriaca*, I have taken with it also in some numbers. In my past experience as a collector I have found *V. rufa* a very scarce species here.

H. G. CUTHBERT.

Scarcity of Wasps at Bray..

We have no wasps this summer, only two of this year's brood having been seen. There are none in the garden where the gooseberry bushes are usually swarming with them during August. Such a complete disappearance is very remarkable, I never remember anything like it before. The gardener killed 233 queens in May and June, but I hardly think this is the reason, because a large number (but not quite so many) have been destroyed other years.

It will be interesting to know whether a similar scarcity has been noticed in other parts of Ireland.

RICHARD M. BARRINGTON.

Œnitis quadra in Co. Waterford.

I found a caterpillar, unknown to me at the time, of this rare moth crawling on the trunk of an elm-tree in Curraghmore on June 30th. The full-fed larva spun a whitish cocoon, and pupated on July 3rd, and the moth, a female example unfortunately with crumpled wings, emerged on the 15th of the same month, thus only remaining twelve days in the pupa state. I believe there are only two or three known records of this insect's occurrence in Ireland.

L. H. BONAPARTE-WYSE.

BIRDS.

The Blackcap Warbler breeding at Lucan.

This interesting warbler revisited Lucan last spring. On the 11th of May I found a nearly completed nest built in a wild rose bush; visiting it again shortly after, it contained four eggs of the ordinary colour and markings, which were left undisturbed. This was the only nest found this year. On the 12th of May, 1896, I found four nests; three were empty, and the other contained eggs of the beautiful brick-red type. The birds built in exactly the same part of the demesne this year as they did in the previous spring.

K. M. DUNLOP.

Mr. J. F. Shackleton records, in the *Zoologist* for 1878, p. 256, the occurrence of the Blackcap Warbler at Lucan. It was observed by him on two occasions feeding on cherries in his garden during the second week of June.

J. N. HALBERT.

The Yellow Wagtail in Ireland.

To the *Zoologist* for August, Mr. Robert Warren contributes a useful paper "On the Breeding Range of the Yellow Wagtail in Ireland." The writer narrates the history of the discoveries by which the home of this species, in Thompson's time confined to Lough Neagh, has been extended to the lakes of Galway and Mayo, so that the bird is now known to have a continuous breeding range along the lakes of Carra, Mask, and Corrib.

"Shore Lark" in Co. Dublin: a Correction.

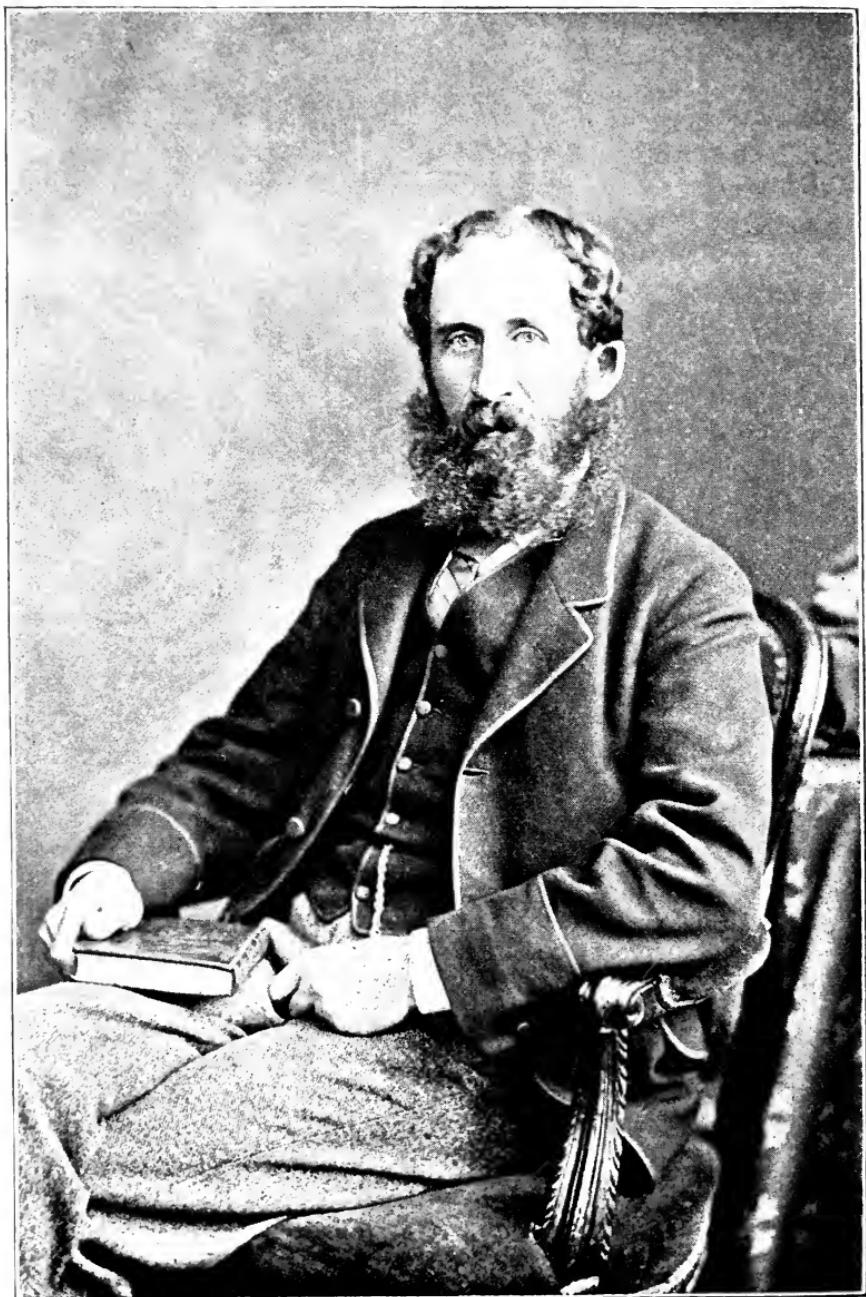
In my notes on Ireland's Eye in last month's issue, I used the above local name accidentally for the Rock Pipit; the Shore Lark being an extremely rare bird, and hitherto unknown in Ireland.

E. BLAKE KNOX.

Grouse Disease.

If any of the readers of the *Irish Naturalist* can forward to me at the Pathological Laboratory, Trinity College, Dublin, specimens of grouse affected by disease, sent as fresh as possible for pathological investigations, I shall be much obliged.

E. BLAKE KNOX.



WILLIAM ARCHER, F.R.S.
(ABOUT 1877.)

WILLIAM ARCHER, F.R.S.

WILLIAM ARCHER, eldest son of Rev. Richard Archer, belonging to an old Co. Wexford family, was born May 6, 1830, and died August 14, 1897, unmarried. His only brother, Holt Waring Archer, predeceased him in 1883, leaving two sons—the sole surviving male representatives of the "Irish Archers" of Enniscorthy. The earliest indication of his scientific tastes and special talent for patient investigations in connection with minute forms of vegetable and animal life, was associated with the Dublin Microscopical Club, which originated in the year 1849. It was founded by a few students fond of natural history, who met at each other's houses; their names were Eugene O'Meara, William Archer, E. P. Wright, Wm. Frazer, and Geo. Porte. Some others became associated with them, and a Club was formed—composed of twelve regular members—to meet monthly in the evening for social and microscopic purposes. A limited number of visitors attended by invitation, and, subsequently, some distinguished scientists accepted the position of honorary members. Mr. Archer was Secretary, and preserved accurate records of all the proceedings for many years. The Club continues to flourish. Dr. Frazer, and Mr. Arthur Andrews who was early co-opted into its ranks, still attend the stated meetings. Professor E. P. Wright and Mr. Archer retired some time since, and were nominated honorary members. It now embraces workers in those branches of science to the advance of which microscopic investigation has so much contributed—botany, geology, mineralogy, and the various departments of natural history—whose names we do not mention; but we can point to a goodly list of former members, such as the late Dr. David Moore, Director of the Glasnevin Botanic Gardens; Dr. John Barker, Curator of the Museum of the Royal College of Surgeons, Ireland; Admiral Jones, an indefatigable lichenologist, who perished in the sad railway accident at Abergele; Dr. M. H. Colles, Captain Hutton, now in New Zealand, and Professor Hull, late Director of the Geological Survey of Ireland, with others, whose contributions are recorded in the *Proceedings*.

From the year 1864 the stated minutes of the Club were

published in the *Quarterly Journal of Microscopical Science*, reprints being furnished to the members, of which a few copies were bound, and are now much valued : they form three goodly volumes, and in these pages will be found preserved much of Mr. Archer's life-work from 1864 to 1879. When following out his favourite investigations, which related in greater part to the Desmidiaceæ and allied groups, he made long journeys to distant parts of Ireland, wherever he considered there was promising ground for their discovery. He also obtained exceptional acquaintance with German, as well as with Danish and other Scandinavian languages, and developed decided artistic talent for making accurate drawings of these minute and interesting forms, the life-history of which he devoted himself to work out and place on record. The writer is aware that many sleepless nights were spent in ceaseless observations of the conjugation and development of these objects ; he thought himself well repaid if he could add something new to science, or contribute to clear up a dubious point respecting their growth.

He was an active contributor to the meetings of the Dublin Natural History Society, which, we regret to say, ceased to exist after publishing six volumes of *Proceedings*. On June 5, 1859, he described a new species of *Staurastrum* ; this was succeeded by other important papers, one of which established the presence of zoospores in Desmids (vol. iii., p. 21) ; also one relating to abnormal growth in Desmids (vol. iii., p. 37) ; descriptions of new species of *Cosmarium* and *Zanthidium* (vol. iii., p. 49) ; on *Micrasterias* (vol. iii., p. 69) ; on several new species of *Closterium* (vol. iii., p. 78) ; and on *Ankistrodesmus* (vol. iii., p. 85). In the succeeding volume iv. he contributed the discovery of *Cystopteris fragilis* near Dublin (p. 2), on *Palmoglæa* (p. 12) ; new species of *Cosmarium* and *Penium* (p. 49) ; on the occurrence of *Polypodium Phe-gopteris* near Dublin (p. 60) ; new species of *Cosmarium* and *Arthrodeshmus* (p. 66) ; observations on species of *Micrasterias* and *Docidium* (pp. 78-84) ; record of *Stephanosphaera pluvialis*, new to Ireland (p. 151), and on the genera of *Palmoglæa* (p. 261). In volume v. he described a new species of *Bulbochæta* (p. 9) ; on the genus *Zygomonium* of De Bary and Kützing (p. 114) ; a new species of *Saprolegnia* (p. 136) ; *Asteridia* in *Penium digitus* (p. 144) ; on the conjugation of

Spirotænia (p. 147); on a new cyst-like structure enclosing minute Algæ (p. 192), and an elaborate essay on Rhizopoda (p. 231), with numerous illustrations drawn by himself. Mr. Archer and Professor E. P. Wright were joint Honorary Secretaries of this Society for some time. When Professor Harvey retired from the chair of Botany in Trinity College, Mr. Archer would have been appointed his successor, but declined the post, owing to his over modest distrust of his ability to address a class of students on botanical subjects.

He was elected member of Royal Irish Academy in 1870, and subsequently served on its Council, and as Secretary for Foreign Correspondence from 1875 to 1880. On November 29, 1879, he was awarded the Cunningham Gold Medal, which was presented to him through the President, the late Sir Robert Kane, being the year when a similar medal was given to Sir Robert Ball, then Astronomer Royal, for his scientific attainments. Sir R. Kane in his address mentioned some of Mr. Archer's claims to that valued distinction. Amongst these he stated that in 1855 Mr. Archer had prepared a list of Desmids obtained in Co. Dublin, illustrated with drawings, for the Zoological and Botanical Association of Trinity College (vol. i., p. 94), to which he afterwards added a supplemental list containing additional species. He had edited for the second edition of Pritchard's work on Infusoria, the article "Desmidiaeæ," was the discoverer and describer of several new genera and families belonging to the Rhizopods, and had published a special communication on *Ballia callitricha* in the *Transactions* of the Linnæan Society.

To the *Proceedings* of the Royal Irish Academy he contributed, in December, 1874, a Paper on "Apothecia occurring in some Scytonematous and Sirosyphonaceous Algæ," and, in February, 1875, another on "*Chlamydomyxa labarynthuloides*, a new species and genus of Freshwater Sarcodic Organism." In June, 1875, he was elected Fellow of the Royal Society. It deserves to be specially mentioned that this distinction and the membership of the Royal Irish Academy were conferred on him without his knowledge by the application of personal friends who were acquainted with his scientific worth, and who also contributed to defray the usual expenses, in testimony of their esteem for him.

In 1876 he was appointed Librarian to the Royal Dublin Society, and when occupying this new sphere he displayed unusual and exceptional ability and energy. By agreement with the Government a large portion of this valuable library was afterwards transferred to form the present National Library of Ireland, and a special building had to be erected for its reception and for the accommodation of the public in a fine reading-room. This was designed by Sir Thomas Deane along with its companion building for a National Museum, to which the Royal Irish Academy's priceless collection of Irish antiquities was removed, filling a special department in that institution. Mr. Archer, in his zeal to secure proper accommodation for the books committed to his charge, opened correspondence with the leading librarians in England, on the Continent, and in America, and published a number of suggestions which he embodied in a pamphlet on buildings intended for holding Public Libraries in 1881; many of these he succeeded in carrying into effect. The transference was accomplished in August, 1890, without damage or loss, and the large collection of books arranged in order on shelving specially prepared after his wishes. In the meantime he had devoted his thoughts to the best mode of cataloguing books in large libraries intended for constant reference by public readers, to secure their rapid supply to those requiring them, and also to enable constant additions to be shelved and catalogued without delay, without undue disarrangement of the different subsections. To carry this out effectively, he himself entered all increments as they were made—no trifling work—as it entailed incessant supervision, the yearly entries amounting to between 2,000 and 3,000 volumes. The "Dewey" system of classification which he adopted has obtained the approval of many who are practically engaged in superintending public libraries and require to carry out similar details. When the Library Association held its Annual Meeting in Dublin in 1884, Mr. Archer was one of its Honorary Secretaries, and to his exertions may be attributed in great part the success of that meeting. He always took much interest in the working of this Association, and attended its annual assemblies so long as his health permitted his doing so.

His incessant labours gradually impaired his strength, and

obliged him to relinquish an occupation so congenial to his wishes. He retired in 1895, being superannuated, his health broken down, and from that time he was, we regret to say, an invalid. His early life was unselfishly devoted to scientific research by which he secured a widespread reputation little understood beyond the abstract world of science. When fulfilling, later in life, the duties of his public appointment as Librarian to the National Library of Ireland, he was brought more prominently before a wider circle, who soon recognised his kindly character and unceasing energy. He was, as head of a great library, eminently successful in discharging his duties and securing the esteem of his subordinates and of the public at large ; those especially who profited by his assistance in forwarding their literary researches will gratefully acknowledge their indebtedness to his patient and untiring desires to meet their wishes and advance their interests.

WILLIAM FRAZER.

THE COLLEMBOLA OF MITCHELSTOWN CAVE.

Supplementary Note.

BY GEORGE H. CARPENTER, B.S.C.

IN my paper on the Mitchelstown cave springtails in last month's *Irish Naturalist* (p. 228), I called attention to the apparently close relationship between the species which I described as new, under the name of *Cyphoderus Martelii*, and the species *Seira cavernarum*, discovered by Prof. Moniez, in the cave of Dargilan, France. Prof. Moniez has since been so good as to compare some of the Mitchelstown insects with his type ; and he informs me that he considers them referable to the same species. The specific name *Martelii*, Carpenter, must therefore be regarded as a synonym of *cavernarum*, Moniez. Whether the species is to be reckoned as a *Cyphoderus* or a *Seira*, must remain a matter of opinion, as it seems, in several respects, intermediate between those two genera. The feet resemble those of a *Cyphoderus*, the spring rather that of a *Seira* ; perhaps the absence of eyes should be allowed to turn the scale in favour of the former genus.

The cave of Dargilan is situated in the barren limestone "Causses" region of the department of Lozere in southern France. Its mouth is stated by M. Martel, who explored it in 1888, to be situated 1140 feet above the bed of the Joute and three miles west of Meyrueis. "It is," he writes,¹ "one of the "most imposing caverns known. The full length of its ramifications reaches the total of more than a mile and a half. It "has no less than twenty halls . . . a river 400 feet long, and "three little lakes. Its longest branch nearly a mile long, "penetrates to the depth of 420 feet below the entrance." It was in this deepest part of the cave that Prof. Moniez found the specimen of *Seira cavernarum*, with which he has now identified the springtails which abound in our cavern of Mitchelstown.

It is gratifying to have the identity of these Irish and French cave-species certified by so good an authority on the Collembola as Prof. Moniez. Strong confirmation is thus afforded to the suggestion, which I made in my first paper on the Mitchelstown cave-fauna, that the same species might be independently developed in two widely separated caves. As I mentioned in my recent paper, very little modification would be required to make the Mitchelstown *Lipura Wrightii* indistinguishable from the Adelsberg *L. stilicidii*. That identical species may exist in two caves separated by hundreds or even thousands of miles may now, therefore, be regarded as an established fact. There is, however, an alternative to my theory that such a species has developed independently under similar conditions, in the two localities. Some naturalists would prefer to regard it as an exceedingly ancient race, which, exterminated or almost so, over the wide tract of country which it once occupied, has found a refuge in the depths of the caves, where, degenerate and blind, it still survives. Further research into the structure and distribution of springtails both above ground and under ground, may help us to choose more definitely between these two views.

¹ E. A. Martel, "The Land of the Causses." *Appalachia*, vol. vii., p. 133.

GALIUM ERECTUM, HUDS., AND G. MOLLUGO,
LINN., IN THE NORTH-EAST OF IRELAND.

BY J. H. DAVIES.

IN the *Irish Naturalist*, vol. v., p. 309, there are some notes of mine, in which mention is made of *Galium Mollugo* having been found in a meadow at Glenmore, County Antrim, and in which there is allusion to the fact of the habitat differing from that in which the plant is usually, if not always, met with in England ; and it was conjectured that, at some remote period, it might have been introduced with grass-seed.

Immediately after reading my notes, my good friend, Mr. William Foggitt, with characteristic kindness, wrote to me stating that he had never known *G. Mollugo* to grow in a grass field. Certainly, in the sister country, it seems to be distinctly a septal plant, occurring only in hedges and thickets, and *G. erectum* to be as distinctly a pascual species. In two localities in North Yorkshire, in which my friend had met with the latter, the habitat in both places is "fields laid down to grass," and in both, the fields had been pasture for many years before the plant had been detected. All the literature of the subject to which I have access is confirmatory as regards the English habitats of the two plants. To cite from county Floras only two examples, out of numerous others which might be adduced, Mr. Druce, in his "Flora of Oxfordshire," has :—

" *G. Mollugo*—Septal. Hedges, etc. Common.

" *G. erectum*—Pascual. Dry pastures, etc. Rare or otherwise overlooked."

And Mr. Townsend, in his "Flora of Hampshire," says :—

" *G. Mollugo*—Hedges, thickets, borders of woods, etc. Common.

" *G. erectum*—Pastures and banks. Very rare."

Mr. Foggitt expressed to me a very confident belief that my Glenmore plant would prove to be *G. erectum*, and recommended a further and thoroughly critical examination; and by way of giving emphasis to his view, he adds: "We find *G. Mollugo* only in hedgerows, never in pastures."¹

Fortunately my friend Mr. Stewart had preserved specimens of the Glenmore plant (July, 1895), which he obligingly placed at my service, and willingly assisted at the needful re-examination; and, on comparing the plants, and also his own, gathered at Whitewell (Co. Antrim) in 1896, with the series of excellent authenticated English examples of the two species, contained in his herbarium, there remains no doubt that the specimens from both stations must be referred to *G. erectum*, and Mr. Foggitt, to whom specimens have been submitted, is in entire agreement.

The earliest record for *G. Mollugo* in the North seems to be Templeton's—"In Mr. Tennant's Lawn at Mount Vernon" [Belfast], 1797, but there are no specimens for reference.² It would, however, now seem very probable that his plant must also be assigned to *G. erectum*. It is conceivable that he might not have known Hudson's plant as a species distinct from *G. Mollugo* of Linnæus, but it was described as such thirty-five years prior to the date of his record.³

Specimens of the Aghaderg, Co. Down, *Galium* (1886), supposed to be *G. Mollugo*, which have lately been received from my friend Rev. H. W. Lett, do not, in any respect, differ from the authenticated examples of *G. erectum* with which they have been compared.

¹ Mr. Foggitt, who has devoted much attention to the study of these two closely allied species, has favoured me with very fine examples of his North Yorkshire *G. erectum*, which, he informs me, have been seen and verified by my friend Mr. J. G. Baker, F.R.S.

² It is not known what has become of that part of Templeton's herbarium, containing his flowering plants. A fragment only of his collection of Cryptogams, mainly Mosses and Hepaticas; also numerous elaborate MS. notes, some of them accompanied by specimens, and many illustrated by his own carefully executed and exquisitely coloured drawings, done for an intended descriptive Flora, are preserved in the Belfast Natural History and Philosophical Society's Museum.

³ In Hudson's *Flora Anglica*, 1762, in which the habitat is given as "In pascuis montosis humidiusculis."

Of the plant discovered at Glenarm (Co. Antrim) close on half a century ago by Dr. Holden, and found there independently by the late Professor Dickie, believed to be *G. Mollugo*,¹ we are without specimens; but my friend Mr. Praeger informs me that he has such, gathered by himself, and these he will, no doubt, re-examine. That they also will prove to be *G. erectum*, seeing that the situation in which the plant occurs there is the same as those of the other northern localities which have been mentioned, seems now not to be an unreasonable assumption. The only examples of the Saintfield (Co. Down) plant at present available are not sufficiently mature to enable us to refer them with certainty.²

Both the specific name, *erectum*, and the "common name" which has been bestowed upon it, "The Upright Bedstraw," the latter, it may be supposed, suggested by the former, seem rather inappropriate and may have been misleading. The habit of the plant is not erect, but sub-decumbent, only the fruiting branches of the panicle being ascending, and altogether it is much more slender than *G. Mollugo* and its leaves narrower. The lower part of the plant puts forth an abundance of spreading and conspicuously leafy branches, which give a somewhat matted appearance to the patches. The species has not been well understood, but the growing plant having been once seen and identified, a careful observer would not readily fail to recognise it again.

Though the mistake, perhaps not wholly unpardonable, into which I had fallen, in common with other North of Ireland observers, may be deplored; it is a matter for some exultation that the rectification of the error gives an exceedingly interesting addition, not only to the flora of the North-eastern district, but to that of the entire North of Ireland, because so far as can be ascertained *G. erectum*, as an Irish plant, is on record as occurring only in the southern half of

¹ Dr. Dickie's "Flora of Ulster," 1864.

² It must be explained here that this part of my notes was written at the end of last year, and that the suggested examination has since been made, as is afterwards stated.

the country, in II., IV., V., and VI. of the *Cybele* Districts. It is due to Mr. Foggitt to state that the correct identification of this critical species is to be ascribed to his sagacious suggestion.

The meadow at Glenmore in which the *Galium* grows is, botanically, rather remarkable. It is that in which *Poterium Sanguisorba* was noticed some years ago, and which still remains to be the only station for this plant in the north. It is in such abundance that it is certain it must have been there for very many years ; but whether this plant (and the *Galium* also) may be indigenous there, or may have been introduced by human agency, it is difficult to determine. The soil in which it grows is of a more loamy character than that of the remainder of the field, which is drier, yielding plants, to enumerate only a few taken at random, such as *Anemone nemorosa*, *Vicia cracca*, and *V. sepium* (some plants of *V. sepium* with white flowers) ; *Lathyrus pratensis*, *L. macrorhizus* and *Bunium flexuosum*. The Centaury (*Erythraea centaurium*), ever one of the most charming of summer flowering plants, is not unfrequently to be met with ; and the Eyebright, and the Fairy Flax (*Linum catharticum*) are here and there associated. The Bluebell (*Endymion nutans*), the Hairbell (*Campanula rotundifolia*), and Lady's Bedstraw (*Galium verum*) are in plenty ; there is much profusion of St. John's worts, of which three species may be mentioned, *Hypericum perforatum*, *H. pulchrum*, and *H. quadrangulatum* (*dubium*), the last named being so plentiful and luxuriant as to have the appearance, when seen from a distance, of a mass of golden-flowered Ragweed. Ox-eye Daisies (*Chrysanthemum leucanthemum*) give pleasing variety ; *Briza media* is everywhere in the field ; and on a bank overlooking a mill-race, which flows from the river Lagan, there is enormous quantity of one of the rarer Horsetails, *Equisetum hyemale*, growing amongst thickets of Hazel and Guelder-Rose ; and nowhere in the neighbourhood, although it grows in most of the grass fields round about, is the curious little Adder's-tongue (*Ophioglossum vulgatum*) to be found finer or in greater abundance. This is a digression, but may, however, serve to give some notion of the botanical features of the meadow in which grows *Galium erectum*.

The foregoing, with the exception of a few added words, relative mainly to the Irish distribution of *G. erectum*, was written for the January number of the *Irish Naturalist*. Mr. Nathaniel Colgan, M.R.I.A., whose critical knowledge of Irish plants renders his judgment of the highest value, saw the MS., and without giving a positive opinion was inclined to question the correctness of the views expressed. The general description in my notes was thought by him to indicate a plant, which corresponded to one growing in his lawn at Rathmines, and found also in the garden of the late Mr. More; both known to have been introduced with grass-seed, and named as *G. Mollugo* var. *insubricum*, Gaudin. Mr. Colgan has since favoured me with specimens of the Dublin plant, which differs from that at Glenmore in that it is much more robust, the branches more numerous and more spreading, the inflorescence more profuse, and the leaves relatively broader and slightly obovate; and differing as it does from *G. Mollugo* growing in hedges, the question arises, under which species should it be placed? That it should occur in situations such as mentioned above, is, nevertheless, a deviation from what seems to be the general rule. The determination of our northern plant, however, was not based upon a consideration of habitat, nor was it intended to use that as an argument to fortify a position as to which there might have been some lingering doubt. Still, such considerations have their value, and in this instance they led to the re-examination of supposed *G. Mollugo* growing in open grassy places. Mr. Stewart, after reading over Mr. Colgan's observations, wrote to me: "I have again gone over the specimens with the help of Mr. Foggitt's well-selected and beautifully prepared examples of *G. erectum*. I still hold to the correctness of the name, but a few months will settle the question effectually."

Galium insubricum, Gaud., seems to me a somewhat shadowy creation. In Nyman's *Conspectus* (1854), it is not even mentioned, and Sir J. D. Hooker in *Student's Flora* (1884), cites the name as a synonym of *G. Mollugo*. Is there room for a distinct variety between that species and *G. erectum*? Mr. Stewart thinks not. In this connection it is to be noted that Hooker places the latter in the rank of a sub-species;

howbeit, by a process of excessive nicety of refinement, perhaps more to be disparaged than approved, at least two varieties of each species have been more or less fancifully described; and some continental botanists, taking still higher flights of fancy, have evolved no fewer than four species.¹ The variety *insubricum* seems delusive, but if it must be taken into account its proper place would appear to be under *G. erectum* rather than under *G. Mollugo*. Seeing that Mr. Colgan had not before him any specimens of our northern plant, his remarks did not go beyond what was warranted by a reasonable, scientific scepticism; but in face of the expression of doubt, by so careful a botanist, as to our plant being *G. erectum*, and notwithstanding Mr. Stewart's strong conviction of our being right, it was considered better to delay the publication of my notes. The postponement is not to be regretted, because in the interval there has been opportunity, not only for extended observation of the growing plant, but to gather together examples from all the localities of the district, with the exception of Templeton's old station near Belfast, and those at "Riverside near Cullybackey" and Ballymena. On the banks of the Main River at Cullybackey (where there is abundance of *G. boreale*), search has been made in vain by Miss Knowles and by myself for *G. Mollugo*, which is said to be there; and, unfortunately, Rev. S. A. Brennan, who is the authority for the record of the plant at that place, has not any specimens. It may possibly yet be found, though the situation is not one in which it is very likely to occur. In a field not very far away from the place, an interesting form has this year been noticed by Miss Knowles and Rev. Dr. Buick, and through their kindness I have had the pleasure of collecting it there. A *Galium*, supposed to be *G. Mollugo*, discovered by Miss Knowles between Ballymena and Broughshane, cannot this year be found, but the situation, as I have had the opportunity of seeing, is one in which it might very likely have been eaten by cattle, as has been the case in other places, and it will probably reappear. The plants, therefore,

¹ *G. dumetorum*, Jordan.
G. viridulum, Jordan.

G. album, Lamarck.
G. rigidum, Villars.

from these three localities cannot be taken into consideration in the present inquiry. The result of the most careful and painstaking scrutiny of specimens from other stations in the district, and comparison with authenticated examples of the two species, is to establish satisfactorily, I think, the accuracy of my former conclusions, and in this I may say Mr. Stewart concurs.

Several of the *Galium* are known to be very precocious. *G. Aparine*, annual though it be, in the first week of January of the present year, was observed with stems six inches long, and *G. verum* and *G. palustre*, in sheltered places, were seen in February. *G. Mollugo* is also very early. In its North Yorkshire localities, where Mr. Foggitt has had it under close observation for me, he informs me that it was above ground early in January, and he has sent me stems, some of them fully twelve inches long, gathered in the early part of February of this year. Though it might have been supposed that its near ally, *G. erectum*, might have been looked for about the same time, it is relatively much belated, and, as a matter of fact, in none of its Yorkshire stations, where my friend sought for it, was it visible until the 20th of April, more than three months later than *G. Mollugo*. It may be of interest to state in this connection the approximate times of the up-springing of our northern plants in those localities of which I have information. At Aghaderg, Co. Down, 30th March (Rev. H. W. Lett); Saintfield, Co. Down, 24th April (Rev. C. H. Waddell); Cullybackey, Co. Antrim, 21st May (Miss Knowles); Whitewell, Co. Antrim, 1st May (Mr. Stewart); and Glenmore, Co. Antrim, where the situation is much exposed, 17th May in one patch, and the 24th May in others. The variation in the times of its first showing, in these places, it may be assumed is to be set down to difference in soil and situation. The great disparity in time of the springing up of the two species, which, roughly speaking, is about three to four months, is remarkable, and may be regarded as a distinctive feature not without value. This was unknown to me until after my first notes were written, or it might alone have been sufficient to have justified a strong suspicion that our plants were different from *G. Mollugo*. In the meadow at Glenmore there have been

counted at least eight patches of the plant, some of them very large, the largest covering an area of upwards of twelve square yards. In three of these plots the general aspect of the plant differs from that of the others in that the stems are less decumbent, the form of leaf narrower and more linear, and the internodes of the primary flowering stems longer. In all, there is some dissimilarity in the leaves, not only in the same stem, but to some extent even in the same whorl. Only in the lower whorls of some stems has the form of leaf any appreciable tendency towards being obovate, a tendency which may be noticed also in those of the lowest whorl of other species of the same genus, but these leaves are evanescent. The variation in form of leaf in plants in different parts of the field, ranging from linear oblong to comparatively broad lanceolate, cannot be held to constitute any specific or even varietal distinction, and is probably to be attributed to the nature of the soil and other local conditions. In all, the fruiting branches of the panicle are erect, or sub-erect, with trichotomously branched umbels. The leaves of all in the early stage of growth are erect, afterwards spreading or erecto-patent, and it has been noticed that in some of the main flowering stems, especially in those of the less slender forms, they become reflexed. In the plant which I regard as normal *G. erectum*, as also in the more robust forms, the corolla is pure white and the leaves grass-green; in some others the flower is slightly creamy, and the foliage a yellowish green. The short growth, which was at first supposed to be from the base of the main stems, giving a tufted and matted appearance to the patch, is for the most part an independent growth of short, weak, sterile stems, many of which fade about the time the flower-buds of the primary stems begin to expand, which, in the case of the Glenmore plant, did not occur this year until late in July, though at Whitewell and Cullybackey it was observed in flower in the latter part of June. The inflorescence has a pleasant fragrance, resembling that of dried Woodruff. The number of leaves in a whorl being very variable, is not to be depended upon as a distinctive mark of any importance. In the Glenmore plant there are as few as five, and as many as nine, and in the Whitewell plant there are many whorls with ten, and some with twelve leaves, but

the prevailing number is six. A set of specimens from five of the patches in the Glenmore meadow was sent to Mr. Colgan, to whom I am beholden for much kind assistance. Three of these he considered to be *G. erectum*, but the other two, in which the form of leaf is less narrow, he would hesitate to refer to that species. To my mind they seem to be forms of the same, and are certainly unlike any of the many typical examples of *G. Mollugo* which have come before me; and if they must be regarded as varieties, then I think they ought to be associated with *G. erectum* rather than with the other species. It is, however, satisfactory that, to use his own words, Mr. Colgan is "now quite convinced of the occurrence of *G. erectum* at Lisburn."

At the Saintfield station Mr. Waddell has discovered the plant growing in a second place, which he describes as "practically a meadow."

Between the plants in the two places here, there is also some slight difference, the leaves in one being rather narrower than those in the other, but that both are to be set down to *G. erectum* there cannot be any doubt. Freshly gathered examples have not been obtained from Glenarm and Aghaderg, but good specimens, collected some ten years ago, have been supplied from the former place by Mr. Praeger, and from the latter by Rev. H. W. Lett, and in both cases the plant previously recorded as *G. Mollugo* must be referred to *G. erectum*.

Of all the plants that have been under examination, the two extremes appear in the examples from Derry and Cullybackey. Of the Derry plant, which grows very luxuriantly on the landward side of an embankment along the shore of Lough Foyle at Eglinton, Mrs. Leebold very kindly sent me immature specimens gathered 11th May, but no doubt the plant was above ground very much earlier, because the stems were of considerable length, and the flower buds beginning to show. The characters, save in the remarkable robustness of the plant, resembled more closely those of *G. erectum* than those of *G. Mollugo*.

The mature plants with which Mrs. Leebold afterwards favoured me, were fully four feet in length, very much branched, and the leaves broad lanceolate. The profuseness of the inflorescence, nearly all the branches producing flowers,

is scarcely exceeded by that of any *G. Mollugo* that has come before me, but, at the same time, the cyme-branches are upright. I am informed that in the place where the plant occurs "everything grows very luxuriantly, and the Burdocks are magnificent," and some stems of *G. verum* sent me as illustrative of this, are nearly four feet long. There would seem to be scarcely a plant more variable, or one in which the extremes are more closely connected by a gradation of intermediate links than that under consideration.

On some of the stems of the immature plant sent by Mrs. Leebody there were roots with soil attached. These were planted under an espalier in my garden, and though the stems died, a vigorous growth shortly afterwards sprang up, four of the new stems being fertile, but none of them exceeding some sixteen inches in length, the plant being quite prostrate in habit, and showing no tendency to find support amongst the branches under which it was placed. Save that some of the leaves are more gradually narrowed and the flowering branches very few, short and inconspicuous, the characters are identical with those of the robust form growing by Lough Foyle. If the plant is to be considered a variety rather than a form, there would seem to be as much justification for uniting it with *G. erectum* as with *G. Mollugo*. Possibly the plant under cultivation may have altered characters when more fully established in the soil where it is planted. Mr. Stewart originally assigned it to *G. Mollugo*,¹ and pending further observations it would seem better that this should not be disturbed.

In the Cullybackey plant the leaves are very attenuate, linear, and suddenly narrowed above, the forward-pointing marginal prickles numerous and prominent, and the mucronate points longer than in any other specimens of *G. erectum* with which it has been compared. According to the descriptions, this plant might indeed, with equal fitness, be referred either to *G. Mollugo* var. *Bakeri* or to *G. erectum* var. *aristatum*, but no sufficient reason appears for regarding it as other than a casual state of *G. erectum*.²

¹ *Journ. Bot.*, vol. xxx., p. 281.

² See an interesting paper "On a Yorkshire *Galium* allied to *G. erectum*," by Mr. J. G. Baker, in *Journ. Bot.* i., p. 290 (1862).

Shortly, whereas in *G. Mollugo*, which Mr. Foggitt informs me is hardly at all variable, the leaves are obovate, the flowering branches many and divaricate, the stems very robust, and so long as to appear above the tops of the hedgerows; the leaves of our plant, though varying in form, are not obovate, but lanceolate, oblong, or linear-oblong, the flowering branches of the panicle erect or sub-erect, the stems for the most part decumbent, creeping amongst the grass in which it grows, and are generally short; or sub-decumbent where the grass is long, as a rule hardly, if at all, exceeding two feet in length.

The outcome, then, of the investigation is that, in my judgment, the records for *G. Mollugo* in the north-east of Ireland, leaving out the questionable case of the Derry station, are erroneous, the plant being *G. erectum* or a form of that species. The standing of the latter in District XII., though owing to the absence of specimens from some localities, it is difficult to tabulate with the precision to be desired, may briefly be stated thus:—

***G. erectum*, Hudson.**

First recognised 1896. *Hab.* Meadows, lawns, and grassy places

Fl. end of June till end of August.

DOWN.—Lawn at Aghaderg Glebe, near Loughbrickland, Rev. H. W. Lett, 1886. "Rowallane Lawn," near Saintfield, D. Redmond and Rev. C. H. Waddell.

ANTRIM.—Park at Glenarm Castle, Dr. Holden and Dr. Dickie. Very abundant in an old meadow at Glenmore, near Lisburn, 1895, J. H. D. On débris overgrown with grass at base of the cliffs at Whitewell, 1896, S. A. S. In a meadow behind the Manse at Cullybackey, Miss Knowles and Dr. Buick, 1897.

Mr. Stewart and myself wish to express sincere thanks to those friends and correspondents whose names have been mentioned, who, with much kindness, have supplied notes and specimens.

AMONG THE WILD FLOWERS.

Open-Air Studies in Botany: Sketches of British Wild-Flowers in their Homes. By R. LLOYD PRAEGER, B.A., B.E. M.R.I.A. Illustrated by Drawings from Nature by S. Rosamond Praeger, and Photographs from Nature by R. Welch. 8vo, pp. xiii., 266. London: Charles Griffin & Co., Ltd., 1897. [Price 7s. 6d. ; with gilt top, &c., 8s. 6d.]

One of the most hopeful signs in the present outlook of biological science is the increasing amount of attention that is being paid to outdoor work. It is no longer so necessary as it was to insist upon the—one would think—obvious fact that the study of natural history is the study of *life*, and cannot be successfully prosecuted without close and continuous observation of *living* organisms among their natural surroundings. We want to know all that can be known of their life-histories, how they grow and are nourished, their care for their offspring, their dealings with one another, and their relations with their surroundings, and a thousand other particulars which cannot be ascertained by examining the dried mummies in a museum, or cutting microscopic slices of bits of tissue.

As a result of this awakening interest in the doings of the lower organisms, several admirable works on "live" natural history have recently appeared, and Mr. Praeger's charming little volume is a notable addition to the list. In a series of eleven chapters, or 'scenes,' the author conducts his audience to some selected spot by mountain and bog, sea-shore and meadow, river and hedge-row, and discourses pleasantly on the strongly-contrasting assemblages of plants growing in the several situations. Mr. Praeger is thoroughly in sympathy with Nature in all her moods, and his vivid and picturesque descriptions of the natural features of his selected spots afford delightful reading. Some idea of the character of the book may be gathered from the following summary of the subjects treated under the several headings.

"Scene I." is "A Daisy-starred Pasture" at Ballycastle, Co. Antrim. The various plants in flower are gathered and utilized as material for a very brief outline of the leading facts in the external morphology, physiology, and classification of plants. That these pages are the driest in the book is saying much for the readable character of the rest. No details of minute structure are given, and this omission affords us almost our only opportunity of a mild grumble at the author's expense. We are told that a leaf is made up of *cells*, but what a cell is we are left to conjecture; indeed the author uses the term for several totally different structures. For example, on p. 9, the two-chambered ovary of the Hazel is described as *two-celled*: on p. 47 the huge intercellular spaces in the stems of Reeds are termed "air-filled *cells*": and on p. 194 we are told

that the unilocular anthers of Malvaceæ have "only one cell." In a book intended exclusively for the outdoor worker it would be ungenerous to criticise these small matters too closely but the work of the young field naturalist will be none the worse if he knows something of the marvellous structure of the framework of the plants he studies.

Scene II., "Under the Hawthorns" at Dundonald Glen, Co. Down deals with an assemblage of shade-loving plants; the species noted serving as texts for an account of the phenomena of sleep-movements, parasitism, &c. It is a pity that, in describing the habits of the parasitic *Scrophulariaceæ*, Mr. Praeger should have perpetuated the fanciful account given by Kerner of the function of the scale-leaves in *Lathraea*. The researches of Groom and others have shown that the glands on the epidermal lining of the pocket-shaped cavities are not absorptive organs at all. Their function is the excretion of water, which is given off in considerable quantity into the cavity of the pocket, and escapes thence into the surrounding soil. The concave form of the leaves is not assumed with the object of forming a trap for the capture of minute animals, but simply for the protection of the delicate water-excreting hairs lining the cavity.

Scene III., "By the River," is an interesting description of the aquatic and semi-aquatic plants growing by, and in, the Boyne at Bective, Co. Meath; and in Scene IV. we have a charming description of the Murrough of Wicklow, and the characteristics of the maritime plants growing on its shingle-beach. The formidable armature of the Sea-Holly leads up to a short account of plant-defences.

The next Scene, "A Fragrant Hedgerow," treats chiefly of climbing-plants and the object and mechanism of climbing, followed by a brief discussion of plant-movements in general.

A delightful chapter is that descriptive of Scene VI., "A Connemara Bog," with its rare and beautiful Heaths, its numerous insectivorous plants—Sundews, Butterworts, and Bladderworts, and many another striking species. The distributional problems suggested by the peculiar flora of the West of Ireland are dealt with in a very interesting manner.

In Scene VII. we are conducted once more to the sea-shore "where the Samphire grows" (Howth, Co. Dublin), and are introduced to many maritime plants that love to grow in the crevices of the cliffs on that rock-bound coast, where they are exposed to the dash of the salt spray. The presence of *Geranium sanguineum* among the more truly maritime species leads to a consideration of the various devices adopted by plants for the dispersal of their fruits and seeds.

Scene VIII. is "A Flowery Meadow," "waist-deep in flowers," and ablaze with the glorious spikes of the Purple Loosestrife and the creamy masses of Meadow-sweet blossom, mingled with orchids and many other plants. Here comes in very appropriately a clear and most readable account of the numerous contrivances adopted by plants for ensuring cross-fertilisation by the aid of wind and insects.

Next follows "A Study in Weeds" in a cornfield, and a description, based on the occurrence there of two or three species of Catchfly, of the

protective devices whereby the entry into the flower, and spoliation of the honey, by insects incapable of rendering assistance in cross-fertilisation is prevented. Here, too, in connection with the Trefoils, we learn something of the extraordinary symbiotic relationship between Leguminous plants and nitrogen-fixing bacteria.

Scene X. is laid "In the Home of the Alpines" in the English Lake District, and treats of the characteristics of the plants of the high mountains. The size and brilliancy of alpine flowers brings up the general question of the colours of flowers, which is clearly summarised, and references given to other, fuller, sources of information.

The final Scene of this interesting book transports us into the heart of a great city, to a bare cheerless spot amidst squalid buildings, where the flotsam and jetsam of the city have been shot down in unsightly rubbish-heaps. Truly a strange place to select for a study in wild-flowers ! Yet, under the guidance of our enthusiastic leader, even in this forbidding spot our interest never flags for a moment, and we come away with a fuller comprehension of the reality of that great "struggle for existence" which is always going on among plants, as among animals, than we could obtain from a visit to fairer and more favoured scenes.

The volume closes with a useful glossary of technical terms, and a very full index. The proof-reading has been carefully done, only two errors, as far as we have noticed, having escaped correction. In fig. 24 (page 83), the reference numbers of the fruiting spikes of the two species of *Reseda* have unfortunately been transposed ; and on page 234, line 5, the Black Nightshade is, correctly, designated *Solanum nigrum*, but a few lines further on it is referred to as *S. nigra*. We may remark, in passing, that 'calyxes' as the plural of 'calyx' is scarcely preferable to the more usual *calices*.

The work is illustrated by numerous excellent drawings from nature by Miss Praeger, and the seven beautiful plates of " wild-flowers at home," from photographs by Mr. R. Welch, are a particularly attractive and valuable feature. In general 'get up' the book leaves nothing to be desired, but we fear that the high price—and 7s. 6d. is high for a popularly-written volume of 266 pages, even when the admirable illustrations are taken into account—will seriously interfere with the wide circulation which it so thoroughly deserves.

J. W. CARR.

NOTES FROM A TRIP TO LAMBAY ISLAND.

BY ERNEST BLAKE KNOX.

ON the 8th of August last, at the request of the Royal Zoological Society of Ireland, I left Amiens-street railway station by the morning train, accompanied by Dr. Carton, to get some diving birds for the new tanks in the Gardens. The train rattling past the slob-lands of Clontarf and Malahide gave us glimpses of motley congregations of various wild-fowl, the wary Curlew, with his hoarse guttural cry of alarm, and the timid Black-headed Gull, fresh in its immature plumage from the heathery inland bogs, being quite a contrast.

Arriving at Lusk railway station we were confronted by a number of jarveys each having his own idea of the fare to the village of Rush, about two and a half miles distant, the nearest point from which a boat can be got to go to Lambay Island. Our jarvey, being of a loquacious nature, pointed out objects of interest on the way. Passing Sir Roger Palmer's demesne he informed us that "it cud only be bate for rale beauty by one place in the three kingdoms;" where that place was he could not remember. A little further on we came to the village of Rush, consisting of a street nearly a mile long lined by cottages, also having a police barrack, national school, coastguard station, cottage hospital, and some shops dispersed at intervals.

Finding an inn, on inquiry as to what provisions we could get to bring with us, we were rather amazed that no such thing as tinned meat could be got in the village, and had to be content with biscuits, bread and butter, until we got back. A coastguard over from the island, who proved to be a very accurate bird observer, gave us a lot of valuable information regarding the breeding-haunts of its visitors. Having found two boatmen less exorbitant in their prices than the rest, we embarked from the harbour in their yawl.

On our passage over, I observed a large number of Razorbills and Guillemots, either in pairs or as single birds—all very tame. The paired birds, our boatmen informed us, were "mother and daughter," which, indeed, on close inspection, proved to be correct, the adult bird buoyed high in the water with maternal importance, being followed by its small off-

spring, which now and again coming closer to its parent, kept crying for food. We tried to capture several, but in vain, as on close approach the old bird always dived, and the youngster followed. I fancy if we could have separated them we should have been more successful. Gulls, Terns, Cormorants, and Puffins kept crossing us as we neared the island, the Puffins being easily distinguished by their massive bill. Approaching the north side of the island, we could hear the weird calls of the Herring Gulls, interrupted now and then by the almost barking note of the Black-backed Gull.

A boat can approach quite close to the cliffs on this side of the island, the water being very deep even at low tide. The tide being out left a number of rocks covered by sea-weed exposed. These rocks were literally brown with young Herring Gulls, seeming quite tame until nearly within grasp, when they flapped away. Hearing some mysterious sounds issuing from a creek, we determined to explore it. On our entry we disturbed a pair of Sandpipers and a Whimbrel, which we knew could not emit such sounds. The creek was towered over by high cliffs covered with now empty Kittiwakes' nests. Again the mysterious noises began followed by their echoes, seeming at one time like the cries of young hawks, and at another of something grunting and puffing. Dr. Carton first discovered their origin. High up in the cliff on a ledge sat a couple of pairs of Guillemots in a state of great excitement, turning round and round, bobbing their heads, and opening and flapping their wings ; on closer inspection we could see all this was caused by their anxiety to hide their solitary offspring, which was needless, as from their impregnable positions they were quite safe from ever getting to the Zoo.

A little further round the island, turning a promontory, we came on a colony of Shags and Cormorants, some of the latter with outstretched wings and open mouths sunning themselves. The reason of this gaping position of the Cormorant is strange, but may be due to the anatomical defect of development as regards size of the nasal apertures and nasal chambers peculiar to this bird, leaving it to rely on chiefly oral and not nasal breathing after a long flight.

These birds on seeing us, gave quite an aquatic display, each having apparently its own way of getting under the

water in the quickest possible time. Reaching "Fresh-water Bay" we landed, leaving the yawl in charge of our two boatmen. The heather on the island was in full bloom, forming a beautiful contrast to the still young bright green Bracken—the happy hunting, if not fighting-ground of Rabbit and Puffin.

We made straight for the "Seals' Cave," the cliffs round which are the headquarters of the gull family of Lambay. Arriving there, we were greeted by an almost babel of cries—the yelping of some old Herring Gull, as he sedately sat with head thrown back to the sky on some rocky pinnacle, the Kittiwake almost calling his own name, the constant whirr of Puffins' wings as they crossed to their nests.

It was chiefly for Puffins that I came to Lambay, so we sat down to watch these birds as they came in from the sea, with fry held transverse in their parrot bills. As most of my readers are aware, these birds build their nests in rabbit-holes, often at a great distance from the inlet. Many are the fierce conflicts that take place between the usurpers and the lawful owners. The Puffins were rather wary about settling near the burrow of their choice and, until we hid in the Bracken, we could not mark any. Presently we saw a bird alight with food in its bill, and after standing some time on the bank outside, it popped into a hole; running up as fast as we could, we saw him coming out and flying away before we got there; putting my arm into the hole he had just quitted, I could touch nothing even with a stick, and thought we should have to dig the young one out, which might have been very heavy work should there be any anastomoses of the burrow.

The duration of the visit of the Puffin being so short it struck me, after watching some more birds visit their nests, that they really had not time to travel any distance in the hole and come out in the short time they did, and that the young bird either sat near the mouth of the hole or came out to meet its parent as it came in. Marking another arrival I hurried with as little noise as possible, and after the old bird came out I ran my arm quickly into the burrow and had the pleasure of capturing a youngster as he hurried away into the passage.

After this we got as many young Puffins as we wanted, only keeping the strong and more mature birds. I found that

tapping gently in the holes, if the young were out of reach, in many cases had the result of making them run out to meet my hand, as they took the noise for the approach of the old bird up the hole. As I wanted an adult Puffin we had to try and hurry up before one left the hole. After some exertion I succeeded in touching him in a pocket burrow, in return for which I got such a bite that I extracted him still holding on to my finger. Leaving the Puffins we got some Kittiwake and Herring Gulls, and as evening was approaching we sailed back to Rush, from which, after a substantial meal, we set off with our living freight to Dublin.

PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Rabbit from Col. Clayton, a Brown Bear from Mr. Berridge, a Razorbill and a tern from Mrs. Tatlow, a pair of Rheas from Master E. T. Weatherill, and a monkey from Miss M. B. Long. A seal has been bought. 17,960 persons visited the Gardens during August.

DUBLIN MICROSCOPICAL CLUB.

JULY 22.—The Club met at the house of Dr. R. F. Scharff.

Mr. M'ARDLE exhibited the reproductive organs and plants of an *autocious* form of *Riccardia latifrons*, Lindberg, which he collected on decayed wood near the summit of Powerscourt Waterfall, on the May excursion of the Dublin Naturalists' Field Club. It is interesting to note that the same species collected by Mr. M'Ardle on Howth, was a *paracous* form, bearing the antheridia beneath the perianth on the same branch. The specimens under the microscopes showed the capsule and spores, and the antheridia on separate branches of the thalus of the same plant. This peculiarity is ably described by Professor Lindberg in his "Hepaticæ in Hibernia, mense Julii, 1873, lectæ" (*Acta Societatis Scientiarum Fennica x.*, 1874). "*Riccardia latifrons, autoica rarissima paroica.*" It is an interesting addition to the Hepaticæ of the Co. Wicklow.

Mr. G. H. CARPENTER showed *Octhebius Lejolisii*, Mulsant, a small beetle of the family *Hydrophilidae*, which had been found in the rock-pools of Greystones, Co. Wicklow, by Mrs. Carpenter and himself. This insect is a very interesting addition to the Irish fauna, having been only recognised as British two years ago, when specimens were found at Ilfracombe. It occurs on the French coasts both of the Channel and the Mediterranean. The section of *Octhebius* to which it belongs is typical of the coasts of south-western Europe, and the presence of the insect on the Irish shores is another piece of evidence in favour of the old Atlantic continental coast-line.

Mr. J. N. HALBERT exhibited a small clavicorn beetle *Claviger testaceus*, Preyss., usually found in the nests of the Yellow Ant (*Lasius flavus*). Like certain other animals of similar habitat *Claviger* is destitute of eyes, and it has been observed to rely on the ants for sustenance. These in return obtain a fluid by caressing the tufts of hair on the abdomen of *Claviger*. Sir John Lubbock remarks ("Ants, Bees, and Wasps") that this is one of the very few cases of an animal having lost the power of feeding itself. The beetle seems to be very rare in Ireland, but it was taken near Waterford by the late Dr. Power.

Mr. HENRY J. SEYMOUR exhibited specimens of amygdaloidal basalt from the Black Quarry of Squire's Hill, near Belfast. The specimens shown form the lining of some long cylindrical "pipes," which traverse the basalt at several points. These "pipes" are generally about 7 inches in diameter (one is 14 inches by 9 inches), run practically east and west, and dip at various angles from 15° to 80° , sending off numerous small branches which penetrate into the rock in all directions. They are hollow except for a lining of zeolitic material about $\frac{1}{8}$ -inch thick, the rock for a distance of some 3 inches around being altered to an earthy red colour, and crowded with amygdales. Beyond this zone the rock is unaltered, and of the normal type of black compact basalt of the Antrim plateau. The two varieties shade more or less gradually into one another. These pipes appear to have served as channels for the circulation of probably heated waters containing zeolites in solution; and the presence of branches would seem to point to this water being under a certain amount of pressure. The exhibitor intends to examine and describe their occurrence in detail later on, and mentioned that his attention had first been drawn to them by Mr. M'Lean, of the Belfast Field Club, last June.

Mr. H. LYSTER JAMESON exhibited sections of *Phagocata gracilis*, Leidy, a North American planarian, specimens of which had been sent to him by Dr. W. M. Woodworth, who has described its anatomy in detail (*Bull. Mus. Comp. Zool.*, Cambridge, Mass., xxi.) The most striking feature of this species is that there are numerous pharynges arranged along the entire length of the posterior gut diverticula.

BELFAST NATURALISTS' FIELD CLUB.

August 14.—The Club made a visit to Newry, Warrenpoint, and Rostrevor, journeying by the 8.40 train. On arrival at Newry a short halt was made in order to visit the nursery at Daisy Hill. Here the members were met by Mr. Smith, who in the hurried time at his disposal showed the members some of his rarities in plant life. Another section of the members visited the brickfields, where the Boulder-clay affords numerous specimens of erratics. After an hour spent in Newry the train was resumed for Warrenpoint, where the party was taken in charge by Mr. Mann Harbison, who throughout the rest of the day acted as local guide and host. Warrenpoint was all astir with visitors, but little time was spent here. Mr. Barcroft's new steamer, the Pioneer,

was chartered for Rostrevor, and all were soon on board. It would be hard to imagine a fairer scene than Carlingford Bay, with the great jagged tops of the Carlingford Mountains towering on the right, and Rostrevor nestling amidst the old oak woods of Slieve Ban on the left. The passage to Rostrevor was soon made, when the quarry behind the Mourne Hotel was visited. From here the ascent of the mountains was commenced through the old natural oaks. An agreeable climb soon brought the members to Cloughmore, the great boulder on the summit of the hill overlooking Rostrevor. Here some time was spent enjoying the delightful vistas spread out on every hand. The descent was soon made to the shore, where some time was spent in the demesne of the Honourable A. G. S. Canning, inspecting some rare plants and a valuable and unique collection of foreign cattle and fowl. One field had quite an Asiatic appearance, with a group of the huge shaggy yaks (bull, cow, and calf), and a variety of other animals. Mr. Canning courteously met the members and explained the different characteristics of his extraordinary herd. On arrival at Rostrevor an ample tea was provided by Mr. Mann Harbison and his family. After tea a little time was spent about the village, a number of the members going to the old graveyard of Kilbroney to see the ancient cross there, several photos of which were taken. This cross stands beside the grave of the 8½ feet "Irish giant," to whom a large cross has been erected. A pleasant ride along the shores of the bay brought the members in good time to Warrenpoint to catch the last train to Belfast.

AUGUST 28.—GEOLOGICAL SECTION.—Excursion to Cushendall *via* Retreat. On arriving at Parkmore the road to Retreat was taken and visits paid to many of the numerous cuttings and trial shafts that have been opened in the slopes of the basalt-capped hills in search for bauxite, which occurs in great abundance in this locality. In Ballyemon Glen a very fine exposure of rocks was examined within a small area near the Waterfall. Sections of Old Red Sandstone, Trias, Greensand conglomerate, Chalk, and basalt occur, intersected by a dyke of basalt standing up as a wall about 6 feet above the rocks through which it has cut. The greensand conglomerate is about 3 feet 6 inches thick in this locality, and contains water-worn pebbles of quartz and blocks of schist and red sandstone that have cropped out near the shore-line of Cretaceous times. Many fragments of Greensand fossils were found. Proceeding towards Cushendall the same sequence of rocks was observed on the slopes of Lurigethan. Several quarries of felstone porphyry were visited, and on the walk to Cushendall the characteristic outline of a volcanic neck was observed in the dome of Tiveragh. After tea in the Glens of Antrim Hotel the party drove up the beautiful Glenariff, noting many objects of interest, geological and botanical, on the way. One member pointed out the Rose Bay or Narrow-leaved Willow-Herb growing luxuriantly near the stream above the glen, whilst others had observed the Bladder Fern growing on the sections visited in Ballyemon Glen.

DUBLIN NATURALISTS' FIELD CLUB.

AUGUST 21.—EXCURSION TO FERNS.—A dozen members only attended this excursion which started from Harcourt-street by the 10 a.m. train. Ferns was reached shortly before one o'clock, and the party received a warm welcome from the Rev. Canon T. B. Gibson and Dr. G. E. T. Greene, who acted as guides for the day. Unfortunately some very heavy showers materially hindered field work, but in the bright intervals collectors were not idle. Going first to the marshy meadows by the banks of the Bann, the party afterwards crossed the high road and explored the plantations and hedgerows on the hills west of the town. Among the beetles collected were *Meligethes erythropus*, *Lema septentrionis*, *Chætocnema hortensis*, Fourc., and *Ceuthorrhynchus litura*, while *Pentatomia baccarum*, immature *P. prasina*, and *Phytocoris varipes* were noteworthy bugs. The beautiful tubular snares of the large spider *Agelena labyrinthica* were abundant on Furze bushes. Three species of planarian worms—*Rhynchodemus terrestris*, *Polycelis nigra* and *P. cornuta* were collected and identified by Mr. H. L. Jameson. The botanists of the party gathered the following noteworthy plants:—the Round-leaved Sun-dew, *Drosera rotundifolia*, L., the Marsh St. John's wort, *Hypericum elodes*, L., the Three cleft Bur-Marigold, *Bidens tripartita*, L., the Golden-rod, *Solidago virgaurea*, L., the Ivy-leaved Bellflower, *Campanula hederacea*, L. (in marshy meadow between the Railway and River Bann, a new locality for the plant), the Sea Bindweed, *Convolvulus soldanella*, L., and the Royal Fern, *Osmunda regalis*, L. On trees the curled Bristle-moss, *Uloa crispa*, Bridel., occurred; while the curious Liverwort, *Porella platyphylla*, L., was gathered in some quantity on the stones at the summit of the Castle, to which the party mounted under Mr. Gibson's guidance. The other antiquities of Ferns—the ruined monastery and cathedral, the tomb of S. Edan in the church, and that of King Dermot McMurrough in the graveyard—were also visited. After being most hospitably entertained at the Rectory, the naturalists returned to town by the evening train.

CORK NATURALISTS' FIELD CLUB.

AUGUST 7.—A very successful excursion to Youghal was held, at which the Committee decided to give a book prize to the member who collected the largest number of plants during the trip. Nine collections were sent in to Mr. R. A. Phillips. The winner, Mrs. Hughes, being successful with 138 species. The plants of most interest sent in were the Yellow Loosestrife, Lesser Broom-rape, and Common Bladderwort (in flower); a far larger number would have been gathered except for the rain—in consequence of which we had to leave the bog and sea-side plants alone.

SEPTEMBER 11.—The last excursion of the season was made to Ballinhassig Glen. After an interesting climb and ramble through this romantic spot, where some rare liverworts and mosses were found, tea was provided, and the party returned to Cork.

NOTES.

BOTANY.

PHANEROGAMS.

County Down Plants.

Cycling last month through Co. Down, a few locally uncommon plants were noted. The best was *Typha angustifolia*, which grows with *T. latifolia* in the mill-dam by the shore at Bishop's Mill, three miles north of Portaferry; *Torilis nodosa* grew near by. *Papaver Rhaes* was seen about the railway at Downpatrick, *Raphanus maritimus* about Portavogie and Ballyhalbert. *Sium erectum* was seen near Strangford, and also *Juncus glaucus*; *Rumex Hydrolapathum* at Killough, *Beta maritima* at Portaferry, and *Koeleria cristata* at Ballyhalbert.

R. LLOYD PRAEGER.

Dryas octopetala in Co. Antrim.

In the *Irish Naturalist* for May last there was a brief reference to the re-discovery of *Dryas octopetala* in the County of Antrim; since then I have, through the courtesy of Rev. H. W. Lett, been introduced to the spot where it was found by him in 1884. The occurrence of the Mountain Avens in this county is of much interest to northern botanists. The first discovery of this plant in the North of Ireland was by Templeton, on 17th August, 1796, on the rocks of Benevenagh, County of Derry. Mackay, in his Catalogue of Irish Plants, 1825, and again in *Flora Hibernica*, 1836, ignores Templeton's discovery in Derry. He attributes this find to Dr. Moore, but says "Mr. Templeton finds it in County Antrim" (*Cat. Ir.*), "County Antrim, Mr. Templeton" (*Flor. Hib.*). The compilers of the *Flora of North-east Ireland* on examining the Templeton MSS. could not find any note of his having gathered the *Dryas* in Antrim, and assumed that his record for Derry had, by Mackay, been inadvertently transferred to Antrim; I still remain of this opinion, and thus Mr. Lett's discovery came as a surprise.

The plant does not grow on Sallagh Braes, properly so called, but on the cliffs north of Knock Dhu, a hill of small extent which is interposed between Sallagh Braes in the townland of Sallagh and the cliffs which face the north in the townland of Drain's Bog. Knock Dhu has a considerable elevation, rising from 1,100 feet at the top of the cliffs to 1,260 at the summit, the botanical interest being centred in the crags both north and south. On turning the shoulder of Knock Dhu *Dryas* soon appears scattered over the precipitous rocks from near their base

up to near the summit, and is fairly plentiful, bearing on 5th August both flowers and fruit. The occurrence of the plant is very similar to what we find in Derry. There it grows at an elevation of about 1,100 feet on basaltic rocks which have a northern exposure. It is singular that a plant so easily recognised should remain unseen so long. Did Templeton inform Mackay of its occurrence on Knock Dhu and yet neglect to note it in his journal or his MS. Flora?

S. A. STEWART.

[Mr. Stewart's note is of much interest, and supplies what has been wanted with regard to the occurrence of this plant in Co. Antrim—definite particulars as to its habitat and distribution; and the correction which he makes as to its station—Knock Dhu, not Sallagh Braes—is timely. To ourselves, Mr. Stewart's note is satisfactory as justifying our remark that it was unlikely that so conspicuous a plant could have so long escaped notice at Sallagh Braes, in spite of very positive statements to the contrary. Sallagh Braes is well-known ground and our local flora is full of references to the plants which grow there. Knock Dhu, on the other hand, is almost unworked, and hardly a plant is recorded from it.—E.Ds.]

—
ZOOLOGY.
—

—
MOLLUSCA
—

Hyalinia excavata in County Fermanagh.

Mr. Langham and I recently discovered this rare British species under pine bark in the extensive demesne of Tempo Manor. The wide umbilicus distinguishes it at once from its nearest relative *Hyalinia nitida*. It has never been found in any inland county in Ireland before, having only been met with in about half a dozen places on the west and south coasts. In Great Britain it occurs in the extreme south and north and in the south of Scotland. Outside the British Islands it has only been found in a single locality, viz., at Fleusburg in Northern Germany.

R. F. SCHARFF.

—
CRUSTACEA.
—

Cylisticus convexus in Co. Fermanagh.

This extremely rare British woodlouse, the discovery of which in Ireland I announced in the *Irish Naturalist*, vol. iii., 1894, occurs in Mr. Langham's demesne of Tempo Manor, near Lisbellaw. I have stated on a former occasion that it had once been taken in England and once in Scotland. It runs with great agility, and when disturbed partially rolls itself up into a ball. It may be recognized by the tip of the tail being of a light yellow colour, whilst the rest of the body is grey. No other species of *Cylisticus* has such a wide distribution, for it has been taken in Scandinavia, Germany, France, Austria, Turkey; and it ranges even into Boreal North America. Almost all the other species of this genus are confined to South-eastern Europe.

R. F. SCHARFF.

INSECTS.

Wasps In Co. Waterford.

I have observed the same scarcity of Wasps this year about Portlaw, as Mr. Barrington notes in his neighbourhood. I don't think I have seen half a dozen, and I have not heard of any nests.

This is the more surprising, inasmuch as wasps are usually abundant about here. It seems extraordinary that this year should form an exception, when we remember that the spring was so favourable, and the summer very hot. Can any readers of the *Irish Naturalist* suggest an explanation?

WILLIAM W. FLEMING.

Autumn Scarcity of Wasps.

In regard to this district (Blackrock), I can bear out Mr. Barrington's experience as to the scarcity of worker-wasps this autumn. While at Ballybunnion, in Kerry, in August, I noticed numbers of workers of *Vesta sylvestris*, but of no other wasp. Since my return to Dublin I have only seen two males of *V. germanica*, and two workers of *V. vulgaris*. Queens of our six Irish species were not rare in the spring and early summer.

Mr. Percy Freke has noticed the same circumstance at Borris, in Co. Carlow. In a letter, dated 19th August, he writes:—"There has been a most remarkable scarcity of worker *Vespa* and *Bombi* this season that I ever remember. The females were exceedingly numerous in spring and early summer, and I thought we would have a flood of workers presently. I have not yet seen a single wasps' nest this season. Last year I could probably have found a hundred within a mile or so of my house."

It is possible that the very wet autumn of last year may have prevented the impregnation of the queens. I can suggest no other explanation of the present happy scarcity.

H. G. CUTHBERT.

Œnitis quadra In Co. Waterford.

I see Mr. Bonaparte-Wyse's note about this rare moth (ante p. 252), and write to say that I took a specimen in Curraghmore on the 16th of August, 1895.

WILLIAM W. FLEMING.

Collas edusa In Co. Cork.

Mr. R. A. Phillips wrote to me that he saw a single *Colias edusa* near Skibbereen on August 3rd. I have accordingly been hoping for its reappearance, and was pleased to see two on Sept. 12th, four on Sept. 14th, nine or ten on Sep. 15th, and a few more on the 16th, so if fine weather continues I expect they will become more common, and, as in 1888, continue with us till the middle of October or longer. All I have yet seen distinctly enough to distinguish sex, including four captured, were males.

JOHN J. WOLFE.

Lepidoptera In Cos. Wicklow and Mayo.

On the 7th June last, at Glendalough, County Wicklow, I found *Bupalus (Fidonia) pinaria* abundant. Only one larva of *Tanycampa miniosa* turned up where it had been fairly numerous in 1896. A larva of *Geometra papilionaria* was beaten out of birch. On the 2nd August I found *Gonepteryx rhamni* plentiful among thickets on the shores of Lough Mask, County Mayo.

GEORGE V. HART.

Caterpillars of *Hemaris tityus* (bombyliiformis).

I had, on July 28th, five larvæ of this moth full-grown, and six or seven about half grown or less. Of the five, three were light-coloured, one had no brown or red marks whatever when viewed from above, and only a mere trace of red about each spiracle. From the first moult to the last one all are green on the back. Some, towards the end, show a little red at the spiracles; all, however, are always dark red or brown underneath (the green one included). As the season advances, a good many of the Scabious leaves on which it feeds, turn a dull red, and doubtless the colour assumed by the large larva helps it to escape observation. Unlike the other *Sphingidae* which I have reared from the egg (*Smerinthus ocellatus* and *S. populi*), while small it drops readily when disturbed, as all our *Satyridae* do, a useful accomplishment where cattle graze.

J. J. WOLFE.

Bupalus pinaria, L., In Ireland.

In reference to Mr. Bonaparte-Wyse's "Entomological Notes from S. E. Ireland" (*Irish Naturalist* for August, p. 221), I may mention that *Bupalus pinaria* is quite a common moth in fir-plantations at Ballyhyland, Co. Wexford; and it seems to me very likely that its range has been much extended since Birchall, in 1866, was unable to name an Irish locality for it. It should be borne in mind that the Scotch Fir, on which the larva of *pinaria* feeds, is, for practical purposes, scarcely to be counted an indigenous Irish plant, but rather a species which was re-introduced after having reached the verge of total extinction: so that it is almost necessary to regard the moth as a recent settler in this island. A parallel case in England of a beetle (*Asemum striatum*), likewise attached to Pine and Fir, is mentioned in *Science-Gossip* for August (p. 72). Until 1893 this was a strictly northern insect in Britain, found only in Scotland and Cumberland, but during the past four years it would appear to have established itself in Surrey and Hampshire, where, as in the east of Ireland, the Pine is an introduced species. The great Pine Saw-Fly (*Sirex gigas*), which is thought to be on the increase in Ireland, is a somewhat analogous instance among the hymenoptera, to say nothing of the Squirrel, among mammals, and the Crossbill among birds.

C. B. MOFFAT.

Bupalus piniaria In Co. Kildare.

In the August number of the *Entomologists' Monthly Magazine* Mr. G. V. Hart mentions having taken this moth at Glendalough during Whitsuntide, I presume of this year. It may be worth mentioning that I took it in Co. Kildare in May, 1896.

PERCY E. FREKE.

BIRDS.

Montagu's Harrier Breeding In Ireland.

On the 24th August last I received a letter from a cousin of mine in Co. Kerry, enclosing in the flesh what I identified as a young female Montagu's Harrier. He had shot it on the 20th August, and says:—"I have seen six birds of this kind (four young and two old) constantly about in a rocky ravine near here and the one I enclose is a young bird . . . "The old hawks make a strange clucking noise and the young a kind of whistling scream." I have skinned the bird, and Dr. Bowdler Sharpe on inspection kindly confirmed my identification. The exact spot where the specimen was killed has been given me, but I refrain from disclosing it in case any of the birds should nest there again next year. According to Mr. Howard Saunders' "Manual of British Birds," *Circus cineraceus* has only occurred three times in Ireland, and has never before been reported as having nested, so that the above facts seem well worth recording.

JOHN H. TEESDALE.

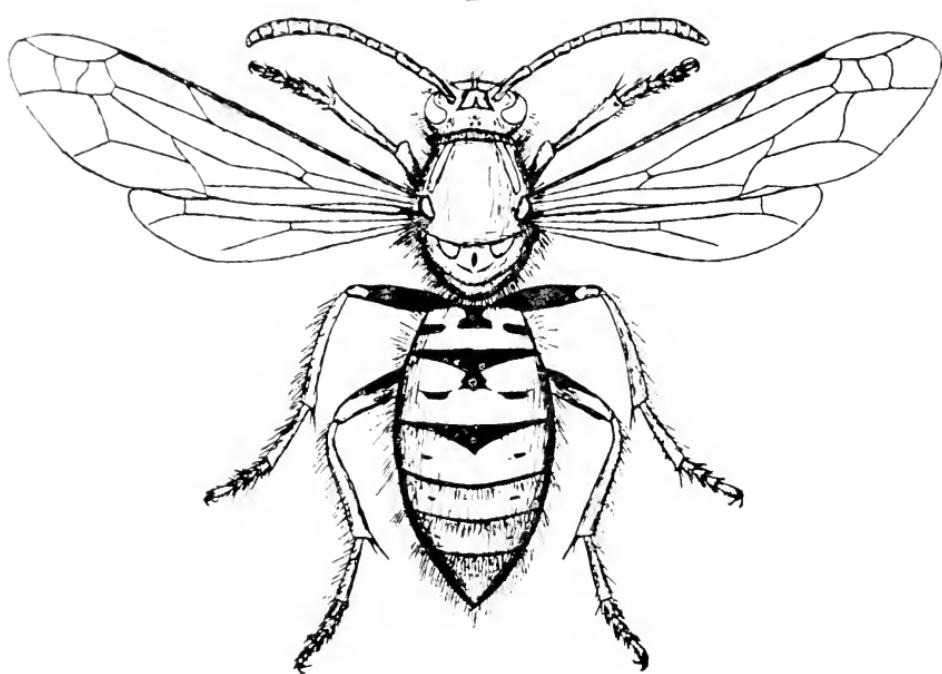
A Marked Pigeon.

On August 9th, Mr. Welch and I were climbing round the base of the great cliff at the eastern end of Ireland's Eye, when he picked up, on a bare rock near tide-level, a pigeon's leg, encircled by an aluminium ring. We had just flushed a fine Peregrine Falcon off the cliff over our heads, and no doubt the pigeon had been killed and eaten by him. The leg was picked clean, nothing but the claw, bone, and ring remaining; and it was evident that the pigeon had been recently killed. On the ring, in raised letters, was the legend "65 L 18 F 97 C."

The daily press has been full of notices of pigeons during the last several weeks, but the information is somewhat contradictory, and I cannot match this pigeon with any of which notice has been taken. 100 pigeons were liberated near Heligoland on July 13 (June 13 according to another account) by the Altona Club or other German pigeon-flying societies. It would appear that these pigeons bore an aluminium ring with the word "Nordpoh" on it. 2,000 German pigeons were liberated at Dover about the middle of July, but these are stated to have been marked by a rubber band. Herr André's pigeons, it is stated were marked "André Expedition, A.D. 1897."

R. LLOYD PRAEGER.

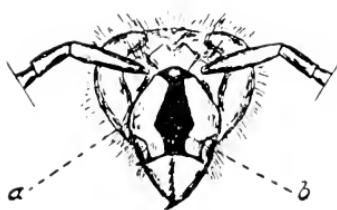
I.



II



III.



IV.



VESPA AUSTRIACA, Panz. (I., II., IV.)
V. RUFa. L. (III.)

A MYSTERIOUS IRISH WASP.

VESPA AUSTRIACA, PANZ. (ARBOREA, SMITH).

BY H. K. GORE CUTHBERT.

THIS species was first described as a British wasp by Mr. Frederick Smith in 1837, in the first volume of the *Zoologist*, then edited by Edward Newman. Since that date the insect has been taken in different parts of England and Wales, ranging as far north as Yorkshire. I believe it has once been recorded from Scotland. It was first placed upon the Irish list by Mr. Carpenter in 1893, on the occurrence of three specimens at Fassaroe, near Bray, in North Wicklow; and has since been recorded from County Dublin by Messrs. Halbert, Low, Rathborne, and myself. One example has been taken by Mr. Freke at Borris in County Carlow.

My captures of the insect have been by far the most numerous, amongst those who have collected it in Ireland. In 1894 I took four specimens, in 1895 seven, in 1896 three, and this year (1897) ten. About half of these were taken in my own garden at Blackrock, and the rest in the grounds of the Nursery at Monkstown.

I have always found the wasp in most abundance about the end of June, and never far from the vicinity of bee-hives.

M. André, in his "Hyménoptères d'Europe," states that the species known to British collectors as *Vespa arborea*, Smith, is identical with the Continental *Vespa austriaca*, first described in the last century by Panzer, a wasp which has a rather restricted range in Central Europe, occurring in Switzerland and the Tyrol.

Both males and females of *V. austriaca* are known to collectors, but it differs from all the social wasps to which it structurally belongs, in the non-occurrence of workers, or neuters. Hence it is believed by Continental entomologists to be an inquiline, or resident in the nest of some of the social species; a view supported by Mr. R. Newstead in the *Entomologists' Monthly Magazine* for 1894.

No collector of Aculeate Hymenoptera in Great Britain or Ireland has yet met with the male of *V. arborea*, although the males of all our other indigenous *Vespæ* are well known.

Our foremost authority on the Order, Mr. Edward Saunders in a letter to Mr. Carpenter in 1893, stated that *V. arborea*, Sm., will be most probably found to be merely a modified female or queen of some of the social wasps; but in his "Hymenoptera-Aculeata of the British Islands," since published, he adopts M. André's view as to its identity with *V. austriaca*, Panz.

The social species it most closely resembles is *Vespa rufa*, Linn., from which it differs principally in the shape of the black marks upon the yellow clypeus, or portion of the face between the jaws and antennæ, the yellow line on the first antennal joint, and some other minor, but not always constant, particulars.

The plate, drawn from one of my specimens taken last July, shows the typical markings of the insect, and the clypeal differences which distinguish it, in the main, from *V. rufa*.

That there may be something more than accidental resemblance between these two species I am led to surmise from the fact that this year (1897), I have almost always taken both together. *V. rufa*, although it has been taken in the North, appears to be a somewhat southern species in Ireland, and makes its nest in the ground, like our two commonest social wasps, *V. vulgaris* and *V. germanica*. Smith first named the insect which supplies the title of this paper, *arborea*, because he took it, as he believed, in the act of building a nest in a fir-tree, but no subsequent collector or student of the Order, since that date, 1836, has confirmed his observations.

The question of the true identity of *V. arborea*, as it stands, is a very pretty entomological puzzle, which can only be properly solved by a careful examination of the nests of the various species.

Bearing in view Smith's statement in the *Zoologist*, I have during the past three years thoroughly examined every nest of our tree-building wasps, *Vespa sylvestris* and *V. norvegica*, that I could obtain, but without finding anything unusual.

Nests of *V. vulgaris* and *V. germanica*, ground-nesting species, have also yielded no results; but I have unfortunately never had an opportunity of finding the nest of *V. rufa*, which

also, as stated, builds in the ground, by preference at or between the roots of trees.

From the scarcity of wasps' nests I have been unable to carry on these researches in the season of 1897, but hope to do so in the future with the co-operation, as I trust, of some of the entomological readers and correspondents of the *Irish Naturalist*.

REFERENCES.

Zoologist, Vols. I. and VII., First Series.

“Catalogue of the Hymenopterous Insects in the British Museum Collection.” By F. SMITH.

Entom. Monthly Mag., July, 1894.

“Hymenoptera-aculeata of the British Islands.” By E. SAUNDERS.

EXPLANATION OF PLATE 3.

Fig. I.—*Vespa austriaca*, Panz. (*arborea*, Smith)—female. Mag. 3 diam.
 „ II.—Face of *V. austriaca* showing, (a) clypeus, (b) black marking on same. (Mag. 4 diam.)
 „ III.—Face of *V. rufa*, reference as in Fig. II.
 „ IV.—Variations of the clypeal marks of *V. austriaca*.

THE PORTRUSH RAISED BEACH.

BY SAMUEL ALEXANDER STEWART, F.B.S. EDINB.

MR. W. H. Patterson, of Belfast, has favoured me with a quantity of gravelly material collected by him from a raised beach close to Portrush. It may almost be said to be in Portrush, being a very short distance from the principal street and just above the harbour for small boats. On examination this material proves to have considerable interest in connection with our Post-tertiary fauna. Mr. Patterson informs me that the beach in question is situated a very short distance north of the site of the celebrated raised beach at Portrush, discovered long since by James Smith of Jordan Hill, the pioneer of British glacial geology. A street has been run across, and houses now cover the spot where Smith and others obtained so many fossil specimens. The principal interest attaching to Mr. Patterson's discovery lies in the fact

that his gravel-bed is without doubt a fragment of the ancient Post-tertiary beach which up to the present has not been obliterated by extension of the town, though recent observers have referred to it as now inaccessible. The exposure at present available is described by Mr. Patterson as being some 30 feet long by about 3 feet thick,* and lies a few feet above high-water mark. It marks the northward extension of the old beach, or raised sea-bottom. It is not a beach in the true sense, many of the shells being such as live at a considerable depth, and the grouping is such as not likely to be found on an ordinary beach.

Portlock, in 1843, first called attention to this accumulation at Portrush of sand and gravel so highly charged with shells. He enumerated, on the authority of Smith, 79 species of Mollusca as found therein, together with some Annelids and *Balani*. Grainger subsequently examined these gravels, and published a list of 54 species of fossils found by him, a number of which being additional to those previously recorded. Considerable attention was paid to this beach later on, and in the British Association *Report* for 1890, Mr. Alfred Bell, of London, who himself has added considerably to the list, gives 113 species of Mollusca as having been found in the Portrush beach up to that date.

By the list which follows it will be seen that 48 species of marine Mollusca are represented in the small quantity of material handed me by Mr. Patterson. A considerable proportion of these are shells which may be found between high and low-water marks, a good many do not come up to low-water mark, but the largest portion consists of species which range from low-water to many fathoms below it, shells of the Laminarian and Coralline zones. The geographical facies is slightly northern. The northern aspect is not emphatic, but nevertheless, taking Jeffreys's *British Conchology* as our guide, it appears that not one is characterized as southern, while four species are considered as having a northern range. These, however, are only mildly northern.

* These dimensions apply only to the section seen by Mr. Patterson, as the gravels, in their further extension, are covered by soil.

The previously published lists of the shells of the Portrush gravels when compared with those of the fossil bed known as the Turbot Bank, off Belfast Bay, show an intimate relation. This is manifest also in the present list, all the species here enumerated being common to both, save only four, namely *Mactra solida*, *Rissoa cancellata*, *Odostomia lactea*, and *Melampus bidentatus*. Three species are now, for the first time recorded as occurring in the Portrush beach: these are *Mactra solida*, *Odostomia indistincta*, and *O. interstincta*.

Former enumerations have been swelled by land-shells found intermixed, but as these are purely accidental they are not included in the present list of raised beach fossils. It may, however, be mentioned that the following species were found:—*Balea perversa*, *Hyalinia radiatula*, *H. alliaria*; and *Helix puicella*, which was in abundance. Specimens of a *Vertigo* occurred, but were lost before examination.

A portion of the gravels was washed and examined by Mr. Joseph Wright, F.G.S., who kindly undertook to determine the Foraminifera. Mr. Wright has furnished a list of 27 species which he identified from the small amount of material at his disposal, and says that there is not much to remark on this list, the species being such as occur in similar deposits, and might be expected here.

Polymorphina lanecolata is now for the first time recorded for the north-east of Ireland, either in the recent or fossil state, and so also *Nonionina pauperata*, but the latter is a new species only recently described. Three others are additions to the previous list of Portrush Foraminifera,* namely *Miliolina secans*, *Bolivina punctata*, and *Discorbina rosacea*; and lastly, *Textularia gramen* appeared in former list under the synonym of *T. sagittula*, *Bolivina difformis* of present list was *Textularia difformis*, and *Discorbina nitida* was *Rotalia nitida*.

Appended is the systematic list of shells found in the recently exposed section of the Portrush raised beach.

* Wright—“The Post-Tertiary Foraminifera of the North East of Ireland,” *Proc. Belf. Nat. Field Club*, Appendix, 1879-80.

MOLLUSCA.

(The nomenclature and sequence is that of Jeffreys' "Conchology.")

<i>Anomia ephippium.</i>	<i>Rissoa striata.</i>
<i>Mytilus edulis.</i>	<i>R. semistriata.</i>
<i>Lasaea rubra.</i>	<i>R. cingillus.</i>
<i>Cardium norvegicum.</i>	<i>Odostomia acuta.</i>
<i>Mactra solida.</i>	<i>O. unidentata.</i>
<i>Saxicava arctica.</i>	<i>O. plicata.</i>
<i>Patella vulgaris.</i>	<i>O. indistincta.</i>
<i>Helcion pellucidum</i> var. <i>lavis.</i>	<i>O. interstincta.</i>
<i>Tectura virginea.</i>	<i>O. lactea.</i>
<i>Emarginula fissura.</i>	<i>Natica Alderi.</i>
<i>Fissurella græca.</i>	<i>Adeorbis subcarinatus.</i>
<i>Trochus tumidus.</i>	<i>Cerithium reticulatum.</i>
<i>T. cinerarius.</i>	<i>Cerithiopsis tubercularis.</i>
<i>T. umbilicatus.</i>	<i>Purpura lapillus.</i>
<i>T. zizyphinus.</i>	<i>Buccinum undatum.</i>
<i>Phasianella pulla.</i>	<i>Murex erinaceus</i>
<i>Lacuna divaricata.</i>	<i>Trophon muricatus.</i>
<i>L. puteolus.</i>	<i>Nassa reticulata.</i>
<i>Littorina obtusata.</i>	<i>N. pygmæa.</i>
<i>L. rufa.</i>	<i>Defrancia linearis.</i>
<i>Rissoa cancellata.</i>	<i>Pleurotoma rufa.</i>
<i>R. reticulata.</i>	<i>Cypræa europæa.</i>
<i>R. punctata.</i>	<i>Utriculus truncatulus.</i>
<i>R. costata.</i>	<i>Melampus bidentatus.</i>
<i>R. parva.</i>	

FORAMINIFERA.

<i>Miliolina seminulum.</i>	<i>Uvigerina angulosa.</i>
<i>M. subrotunda.</i>	<i>Globigerina bulloides.</i>
<i>M. secans.</i>	<i>G. inflata.</i>
<i>Textularia gramen.</i>	<i>Patellina corrugata.</i>
<i>Bulimina pupoides.</i>	<i>Discorbina globularis.</i>
<i>Bolivina punctata.</i>	<i>D. rosacea.</i>
<i>B. plicata.</i>	<i>D. nitida.</i>
<i>B. difformis.</i>	<i>Planorbolina mediterranensis.</i>
<i>Cassidulina levigata.</i>	<i>Truncatulina lobatula.</i>
<i>C. crassa.</i>	<i>Rotalia Beccarii.</i>
<i>Lagena sulcata.</i>	<i>Nonionina depressula.</i>
<i>L. Williamsoni.</i>	<i>N. pauperata.</i>
<i>L. Orbignyana.</i>	<i>Polystomella striato-punctata.</i>
<i>Polymorphina lanceolata.</i>	

THE POSSIBLE ORGANIC ORIGIN OF QUARTZ-ROCK.

BY G. H. KINAHAN, M.R.I.A.

IN the *Proceedings R. I. A.*, 3rd ser., vol. iii., no. 4, is published a paper on Quartz, Quartz-rock, and Quartzite. In it is reiterated my previous conviction that the protrudes of quartz-rock had an analogous genesis to that of the silicious adjuncts of the modern hot springs. Not being occularly acquainted with such springs, but only with their products, information in connection therewith was asked for in America, and kindly offered by Walter Harvey Weed, U.S. Geol. Survey, who sent a copy of the *Bulletin* containing his report on the "Formation of the Travertine and Silicious sinter by the Vegetation of Hot Springs" (*Extract, 9th Annual Report of the Director, 1887-88*), with specimens. They, however, through some vagary of the American postal arrangements, did not arrive till six months after date, and consequently not till after the above-mentioned paper had been published. This, to me, was unfortunate, as Prof. Weed's researches exemplify the probable correctness of my suggestion.

In his report on the accumulation of the hot springs of Yellowstone National Park, Weed mainly confines himself to the effect due to organisms; but in his letters he states—"The Yellowstone deposits are extremely variable in character, accordingly as they are produced by the action of organic life (*Algæ*), or by evaporation from true geyserites, or by the precipitation of the silica due to cooling and relief of pressure, or due to the cementation of comminuted fragments of sinter formed by other agencies."

The specimens sent were solely to illustrate the action of organic life, but he further writes:—

"I have, of course, a great variety of sinters from the Yellowstone, embracing everything from those formed by evaporation purely, those formed by the solidification of particles which have separated from the highly charged waters and formed a deposit, to those which are in part argillaceous, and which are so largely formed in this manner."

Although in the Yellowstone the secreting organism is principally an alga, in the report he mentions other agents,

such as rushes, worms, &c. He also mentions that although the springs are principally silicious, there are also calcareous or ferriferous, and other springs, accumulating their special rocks or minerals: he largely describes the travertines. Among other facts recorded, is this interesting one, that the late William Archer has in cold springs in Ireland found an alga identical with one in the hot springs of Yellowstone.

Although Weed's report has been published nearly ten years, it seems to be generally unknown, even to those who have visited the Yellowstone. This is to be regretted, as some of the characters of quartz-rock would seem to suggest an organic origin. This communication, however, is not controversial, but suggestive, and is written in the hopes that it may induce some of our numerous microscopists to examine the quartz-rocks for organisms.

Considering that the quartz-rocks are of such great age, and have been subjected to so many vicissitudes, it is not surprising that algal remains or such like, may have gone undetected, more especially when we remember that it is only quite recently they have been authoritatively recognised in the modern accumulation. In 1874, Dr. C. C. Parry noticed the presence of *Algæ* in the hot springs of Yellowstone, and said they would reward special research; but in 1878 Dr. A. C. Peale scouts the idea of organic aid of the hot water accumulation; and it was not till after Prof. Weed's researches were published (1890) that we learned how animal and vegetable life were such important agents in the accumulating of the rock-masses—the adjuncts of the springs.

The limit of heat at the Yellowstone in which *Algæ* grow is 185° F., but such plants are immature and poorly developed; it is not till the temperature is lowered to 140° F. that they attain their full development. Those grown in excessive temperature are often so indistinct as to be nearly undistinguishable under the microscope, but in the rock they form riband-like stripes, or concentric rings of colour. Such lines or "dirt bands," as they have been called, are very characteristic of quartz-rock, but as in the latter they are so mineralized, it seems hard to expect to be able to prove skeletons of plants in them, except possibly on the surface of the layers of depositions, where there are serpentine lines and pinholes

respectively, very like those due to the upper edges of the layers and to the spikes of the *Algæ* in the silicious sinter of the the Yellowstone. These can be seen in the specimens sent by Weed, which have been presented, through Prof. O'Reilly, to the Royal College of Science, Stephen's Green.

In examining quartz-rocks it should be remembered that in many places they have been considerably altered by shearing, and consequently metamorphosis; as is so conspicuous in the County Donegal. Here the older quartz-rocks (Archean) have been changed into a highly quartzose gneiss; while the newer ones, possibly Cambrian or Ordovician (Caradoc), have been subjected to considerable up-thrusting which has sheared the rock over each thrust plane, into flags. In south-east Ireland, however, it is not so; as those associated with the Oldhamians in the Forth Mountain and westward to Bannow, County Wexford, exhibit remarkable markings on the surfaces of the different planes, also distinct changes of colour in the different shelves of rock; which changes of colour, in the modern sinter, are due to the growth of plants in zones of different temperature. Worm-tubes have not been recorded in any Irish rocks except those of the barony of Kilmacrenan, County Donegal, near the Bloody Foreland, and in the hills northward of Ramelton; some of the beds in the latter are sheared and the pipes now appear as elongated compressed tubes. In the "Pipe quartzites" of Sutherland, Scotland, there are remarkable assemblies of worm-tubes; hard to be accounted for, until Prof. Weed's researches have suggested their origin. They seem to have been extensive colonies that flourished in large exposures due to hot springs, similar to the silicious sinter plains of the Upper Geyser of the Firehole River, but of larger dimensions, each worm segregating the silex and thereby forming a pipe. Various features in different places in the different quartz-rock areas suggest analogies with those of the modern rocks; such as the Eagle's Nest, Mulroy Waters, County Donegal, which, on view, has a character similar to the sketch, fig. 53, in Weed's *Bulletin*. Any microscopist who may take this subject in hand I will aid, as far as possible, with information as to the best localities, for research.

THE TUBE-FORMING WORMS.

BY THE REV. HILDERIC FRIEND.

TOWARDS the end of September last, I received from Mr. Robert J. Kirwan, Gardenfield, Tuam, County Galway, a splendid consignment of annelids in a living condition. They were accompanied by the following note. "Mud containing small red worms from a pond at Gardenfield. The worms occurred in such numbers as to give the water the appearance of blood. They, however, disappeared like magic when I approached them closely. They protruded part of their bodies from the mud, and kept them in continual motion. I send these in response to your appeal in *The Irish Naturalist*." This interesting communication supplies me with a text for some notes on the tube-worms in general, with special reference to the Irish species. This group of annelids has been the subject of remark from very early times. The old writers on natural history were familiar with them under such titles as blood-worms or summer-worms, but they often confounded them with the larvæ which abound in similar situations in summer, and are of a bright blood-red colour. They were long ago regarded by the common folk as portents of dire calamity; were observed to be very gregarious; and had even been observed constructing and inhabiting tubes. This latter fact is of value. We know that *Serpula* and other marine creatures, including *Northia* and various tubicolous worms, form abodes either of a calcareous or arenaceous nature, in which their bodies are partially or wholly, temporarily or constantly, to be found. There is room for research here, especially among the freshwater annelids; for we at present know little of the processes involved in tube-forming, or the extent to which it is practised. The tubes are usually of so fragile a nature that they collapse with the slightest touch, and in many ways the conditions for their study are inimical to the investigator.

It does not follow that all the genera now classed as tube-formers live in tubes. So far as I can gather, Müller (*Zool. Dan. Prod.* 2605), was the first to employ the term *tubifex*, and with him it is specific. All worms in olden times were

Lumbricus, so the worm which made a tube was naturally *Lumbricus tubifex*. In time the various worms came to be distinguished not only as species, but as genera; then the old specific term *tubifex* became generic. For a long time, just as every earthworm came to be known as *Lumbricus terrestris*, so all the blood-worms found in ditch and stream, pond or river, were denominated *Tubifex rivulorum*. Eventually it appeared that there were many forms of *Tubifex*, and that they differed so widely the one from the other that they must be separated into different genera under the family name of *Tubificidæ*. Now this family is both large and interesting. Its members are found in many parts of the world, and numerous students of the front rank in this branch of zoology have during the last twenty years given them attention. Foremost among these I may mention our English authorities Beddard and Benham. In America we have the infatigable Swedish worker Eisen. Vejdovsky, Stolc, and others are the Continental representatives. By their combined labours nearly twenty different genera have been discovered and described, and it would require a considerable volume to reproduce all that is now known on the subject.

The family is distinguished from most others by certain well-defined characteristics, while in some particulars the affinities with the other families are equally clear. Thus the genus *Ilyodrilus*, which is unmistakeably tubificid in character, is in many respects closely allied to the *Naidomorpha* (Beddard, "Monograph of Oligochaeta," p. 227). These connecting links are of the greatest value in relation to the question of evolution.

Speaking generally, the members of this family may be distinguished by their delicate and slender build; their transparent integument, through which the blood-vessels and vital organs may as a rule be readily distinguished; and especially by the shape, number and variety of their setæ. These vary greatly. In one or two genera the setæ are of one kind only: in others there are two different kinds, while yet other genera have three and even four different forms. Sometimes one kind is uniformly distributed over the whole body, at other times one kind occurs on the dorsal, and another on the ventral, or one on the anterior, and another on

the posterior regions of the body. Dr. Benham did a good deal six years ago by the publication of "Some Notes on Aquatic Oligochaeta" (*Micr. Jour.*, vol. xxxiii. n.s., p. 187 *et seq.*) towards clearing up difficulties, and making this subject more lucid ; and since then our knowledge has yearly been growing more definite and satisfactory.

In addition to these external characteristics we have also the arrangement of the blood-vessels ; the nature and position of various organs concerned in the processes of reproduction ; and the presence, in certain members, of peculiar chitinous tubes, varying in length and shape with the genus or species, and affording in some cases the readiest means of identification or distinction.

Of the various genera belonging to the family *Tubificidæ*, the following are all which are at present known to occur in Ireland :—*Tubifex*, *Limnodrilus*, *Heterochaeta*, *Psammoryctes* and *Hemitubifex*. Respecting some of these I have already written in these pages from time to time, but I think it will be well in this paper to bring our present knowledge of the Irish *Tubificids* to a focus, in order that future work may be facilitated. As the genuine *Tubifex* has not, so far as I am aware, been placed on record for Ireland since the Annelids have been systematically studied, it may be advisable to give in the first place a brief diagnosis of this typical form. I may take this opportunity of warning collectors who make a study of fresh-water worms against the idea that because one worm in a given collection happens to be the genuine *Tubifex*, therefore the whole of the gathering is made up of that species. It will be frequently found that three or four different species, representing in some cases as many genera, are collected together in one spot.

***Tubifex rivulorum*, Lamarck.**

A slender aquatic worm frequently extending to an inch in length, of a bright-red colour. Very gregarious, living in mud, which it usually makes into tubes into which a portion of the body is thrust. Active, often associated with other species or genera belonging to the same family. Integument very delicate and transparent, enabling the blood-vessels and organs to be clearly seen. Possessed of three kinds of setæ, viz. (1) long, capilliform, or hair-like setæ, usually two or more in the dorsal bundles (intermixed with others), from the second segment to the twentieth or thirtieth. The number of segments in which these

setæ are found seems not to be definite; in one worm they appear to extend further back than in another of the same species. Sometimes they seem to be present in the hinder segments; but this is a delusion arising from a curious hair-like parasite. The longest setæ are about equal to the average diameter of the worm's body. (2) Forked or uncinate setæ, found in all the ventral and some of the dorsal bundles. They vary in number, but three or four seems to be the average. The lower fork is the lesser; a point of distinction which should be remembered. (3) Pectinate setæ intermixed with the capilliform in certain segments in the neighbourhood of the vital organs. I do not think the teeth can be made out with any lower power than a good one-quarter inch objective. To be seen to advantage a one-sixth or one-eighth should be employed (fig. 1). This nicety is the more important because such a genus as *Ilyodrilus*, for example, in many respects resembles *Tubifex* so closely that the utmost care is necessary in the study of this

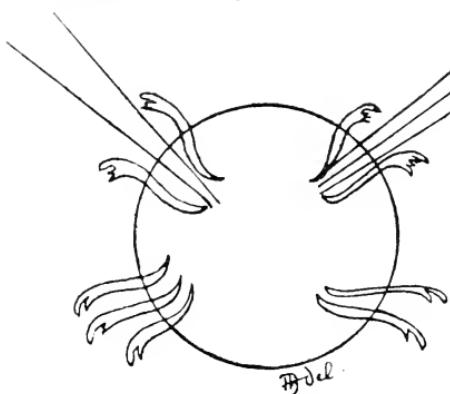


FIG. 1. Setal System of
Tubifex (segment 10).

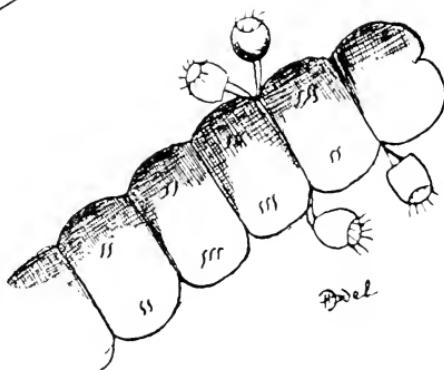


FIG. 2. Parasitic Rotifer on
tail of *Tubifex*.

form of seta. There is no chitinous penis as in *Limnodrilus* and some other genera. In the eighth segment the blood-vessels are enlarged so as to form dilated hearts which are very conspicuous, and supply one ready means of diagnosing the genus. Locality—Gardenfield, Tuam.

Limnodrilus Udekemianus, Clap.

Locality—Ballintoy, July 7th, 1897. See p. 207.

Heterochaeta costata, Clap.

Collected in the Connswater, Belfast, June, 1896. See p. 63.

Psammoryctes, sp.

Antrim, June, 1896. Awaiting further examination. See page 102.

Hemitubifex Benedii (d'Uden).

From Dr. Trumbull, Malahide, 1896. (*J. Nat.*, vol. v., p. 128).

The material which I still have on hand will, I doubt not, yield a few additions to this meagre list, but my time for these

pursuits is sadly limited, and the best results can only be obtained by the study of fresh materials, for supplies of which I am dependent upon the kindness of my readers. It may interest the microscopist to know that these worms often supply pleasing objects owing to the presence on their extremities of certain species of rotifera. One such is represented in the accompanying diagram (fig. 2).

REPTILES AS PETS.

The Vivarium, being a practical guide to the construction, arrangement and management of Vivaria. By Rev. GREGORY C. BATEMAN, A.K.C. pp. 424, illustrated. London: L. Upcott Gill, 1897. Price, 7s. 6d.

Though this work purports to give full information as to all Reptiles suitable as pets, how and where to obtain them and how to keep them in health, it is doubtful whether many readers of the *Irish Naturalist* will avail themselves of the opportunity thus afforded to add a few of these somewhat despised Vertebrates to their stock of household pets. Nevertheless, they will find in this book much to interest them. The construction of a vivarium in itself is of importance not only to the zoologist, but also to the botanist, and what may have been merely intended by the author for Reptiles, might very well be utilised for the rearing and observation of Insects, Spiders and other Invertebrate animals, of the habits of which we have still a good deal to learn.

This work is replete with the most interesting information concerning the habits of Lizards, Snakes, Tortoises, Crocodiles and Amphibians. The distinctive characters of the various species are clearly set forth. No one would have the slightest difficulty, for instance, in distinguishing at a glance the two common English Snakes, *Tropidonotus natrix* and *Pelias berus* after reading the description. Among the many interesting passages, I may mention this statement—and this will be news to many readers of the *Irish Naturalist*—that we possess in Ireland an as yet unused source of wealth in our native frog. For Mr. Bateman tells us, that in the markets of Paris, Brussels and Geneva, the species almost invariably offered for sale is not the Edible Frog (*Rana esculenta*), but our Common Frog (*Rana temporaria*).

No work of the kind has before been published in the English language. Reliable information on the management of Reptiles and Amphibians in confinement could only be gathered from Fischer's German work "Das Terrarium." To managers of Zoological gardens especially, Mr. Bateman's treatise will be invaluable, but it is well worthy of a place in every zoological library.

R. F. SCHARFF.

NOTES.

BOTANY.

NOTICES OF IRISH PLANTS.

In the *Journal of Botany* for September, Mr. H. C. Hart publishes some "Notes on Co. Dublin Plants," which contain some new stations for local phanerogams. In the October number of the same Journal, Rev. H. W. Lett records *Fossombronia cristata* from "Lough Bridan, Co. Down"; we believe Lough Briclan is intended. Mr. Townsend's "Monograph of the British species of *Euphrasia*," now in course of publication in the same Journal, contains a number of Irish stations for these critical forms.

PHANEROGAMS.

Trifolium agrarium (Linn.) a casual in Ireland.

This beautiful yellow-flowered Trefoil has been found, this year, at Drumbo, Co. Down. Naturalized for many years in England, I believe it has not previously been noticed in this country, but it may be predicted that, having once gained a foothold here, it will soon be found elsewhere. From *T. procumbens* it may easily be distinguished by its erect habit. The flowers are not only more brilliantly coloured, but are also larger and more conspicuous.

J. H. DAVIES.

Silene noctiflora and Chenopodium murale in Co. Antrim.

In September last I found *Silene noctiflora* in some abundance on gravelly waste ground in several spots near Larne Harbour. This seems to be a plant of uncertain appearance, and a doubtful native of Ireland. I think it may be safely asserted that it is a recent immigrant at Larne—the neighbourhood of its present habitat has been frequently botanized. The plant has not been previously recorded from Co. Antrim. With less claim to a place in the local flora is *Chenopodium murale*, which I found at the same time growing in the famous gravel-pit at Ballyrudder. Fowl are kept there, and the seed may have come with their food. This species is very rare in Ireland, and usually hangs about ruins and old towns. It is on record as having been found more than half a century ago on a ruined cottage near Belfast—the only note of its presence in District XII.

R. LLOYD PRAEGER.

A Hybrid Groundsel.

Senecio squalidus, "Wall Ragwort," "Oxford Groundsel," or "Cork Ragweed," is not mentioned as a native plant in "Flora Hibernica" (Mackay), and is supposed to be an immigrant to our shores from Greece and other parts of S. Europe. It abounds on garden and town walls in Oxford, and also at Cork (and elsewhere, as at Kinsale and Bandon), and in both cases has been spoken of as an escape from the respective Botanical Gardens of each of these cities.

Some years ago Mr. Carroll sent to More and Moore an intermediate plant presumably a hybrid, as mentioned in "Cybele Hibernica," p. 158. While in Cork the other day I saw in the shunting or goods yard of the Bandon station, a showy group of *S. squalidus* with flowers nearly as large and bright yellow as those of *Chrysanthemum segetum* (Corn Marigold), now very handsome amongst potatoes, etc., in the South. On going to examine it more closely I found it to be *S. squalidus* in a very variable state, there being a sliding scale, or series of forms, from the largest to the smallest rayed form, closely resembling in foliage the Common Groundsel (*S. vulgaris*). I collected a series for preservation but unfortunately lost the bundle in the hurry and bustle of travelling. I have, however, written to a botanical friend in Cork to collect me fresh specimens, as the plants are very numerous in one spot, growing amongst a lot of old iron rails—at first I thought that *S. vulgaris* (the other parent of the presumed hybrid) was absent, but I afterwards found a few odd plants here and there at some distance from *S. squalidus* and its seedlings, but in the same yard or enclosure. Personally, I have no doubt but that this variable series of varieties has resulted from the hybridising of *S. squalidus* as a garden escape with our native *S. vulgaris*, and it gives me great pleasure to add my testimony to the present existence to-day of these intermediates as collected by Mr. Carroll in or near Cork some years ago. According to the "Cybele Hibernica (l.c.) *S. squalidus* " was not known 'as wild' to Mr. Drummond in 1820."

It would be very interesting to know of these or similar hybrids or intermediate forms have been observed at Oxford or other places where *S. squalidus* is known to grow together with or near to *S. vulgaris*.

While on the subject of *Senecio*, I may add that I saw a strong colony of *S. saracenicus* at Bantry, quite close to the town, on the roadside facing the harbour. It was growing on the side opposite the sea at the foot of a wall, and in a wet position.

Drummond originally discovered it in this habitat—but in the woods. The plant is cultivated also by farmers and peasants as a styptic, and so is apt to appear anywhere as an escape.

I am especially interested in wild hybrid plants of all kinds, and am always glad to hear of their occurrence in our native flora.

Ballycastle (Co. Antrim) Plants.

During the Field Club excursion to Ballycastle, Prof. Carr and I spent a few hours on the moors west of Ballycastle; and this not being portion of the excursion proper, one or two plants found there were not reported in the account of the excursion (*ante*, pp. 216-18). For *Carum verticillatum* we discovered a third station in the North of Ireland. It grows abundantly over a limited area of wet moor a hundred yards on the north side of the Bushmills road at Carnsampson, 400 feet elevation. At the same place grew *Listera cordata*, and we noted the enormous profusion of *Habenaria bifolia* as compared with *H. chloroleuca*—this feature was noted over all the ground visited during the three days of the excursion. A few other plants collected on the excursion escaped record. *Potentilla procumbens* was noted in several places east, west, and south of Ballycastle. *Atriplex laciniata* was gathered at Whitepark Bay; *Myosotis repens* at Murlough; and climbing down a chasm on the summit of Fair Head, to escape a heavy shower, I found *Hymenophyllum Wilsoni* growing at the bottom of it.

R. LLOYD PRAEGER.

"Open-Air Studies in Botany."

As a constant reader of the *Irish Naturalist*, I desire to say two words on Prof. Carr's review of Praeger's "Open-Air Studies in Botany." The reviewer remarks, "in passing, that 'calyxes' as the plural of 'calyx' is scarcely preferable to the more usual 'calices.'" This is hypercritical, and, moreover, inaccurate; if Mr. Carr will pledge himself to speak of *stamina* and *corolla*, he may invite authors to use *calices* also; but then he must use *calix*, with an *i*, not *calyx* with a *y*, for the outer whorl; the *y* is due to the early printers misunderstanding the tailed *i*'s of the mediæval scribes, and has no place in a Latin word; if he wants to go to the Greek he must write *cylix*.

Again, he writes, "it is a pity that Mr. Praeger should have perpetuated the fanciful account given by Kerner of the function of the scale-leaves in *Lathrea*. The researches of Groom and others have shown that the glands on the epidermal lining of the pocket-shaped cavities are not absorptive organs at all." Now these researches of Groom were published in the "Annals of Botany," for September, 1897; the "others" referred to I find from the *postscript* to Groom's paper, published in the *Jahrbücher f. wiss. Bot.* (heft 4), and *Flora* (heft 3), both of the present year. Mr. Praeger's book was published in August, 1897; and it is hardly worth while for a critic to express such regret. Did he wish that the author, instead of following the best existing authority, should play the part of prophet, or delay indefinitely what, on the very face of the review (I have not read the book) appears to be an excellent and timely publication, until every fact in Botany is placed above doubt.

MARCUS HARTOG.

ZOOLOGY.

—
CRUSTACEA.
—**Some new Irish Crustacea.**

A "Further Report upon the Free-swimming Copepoda of the West Coast of Ireland," by Mr. Isaac C. Thompson, F.L.S., has been recently published in the *Trans. Biological Soc. Liverpool* (vol. xi., pp. 127-131 and table). The material dealt with in this paper was collected off Valentia Island, Co. Kerry, by Messrs. Browne, Walker, and Gamble, and the Misses Delap in 1896 and 1897. Several interesting forms are recorded, including *Rhincalanus cornutus*, hitherto only known in British waters from off the Shetlands. A careful table gives the exact localities and depths where specimens of each species named, and indicates their comparative abundance.

The Linnean Society's *Journal (Zoology)* for the current year (vol. xxvi., pp. 226-232, pl. 17, 18) contains an important paper by Mr. Alfred O. Walker, F.L.S., "On some new species of Edriophthalma from the Irish Seas." Of the two Irish forms described as new to science; one, *Aspeudes hibernicus*, was taken by Mr. Gamble at Valentia Harbour, while the other, *Parapleustes megacheir*, was dredged at a depth of 750 fathoms off our south-west coast by the Royal Irish Academy Expedition of 1888.

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INSECTS.
—**Collas edusa in Ireland.**

There seems to have been quite an immigration of the Clouded-Yellow Butterfly into the South of Ireland this year. When staying at Tramore, Co. Waterford, in August and part of September, I found it not uncommon. The weather was very bad, but on the few fine sunny days with which we were favoured, if the wind were not too strong, I generally saw one or more individuals daily. They seemed to prefer keeping to the coast-line, chiefly the sand-hills, and the cliffs by the sea. I met with but two individuals at even a very short distance inland. The great majority of those I saw were males, and many of them were in very poor condition, sometimes, indeed, being so rubbed and denuded of scales as to be reduced almost to the condition of clear wings. I only succeeded in taking a few, being generally armed with a bee-net, too small for capturing butterflies. On returning to Borris, Co. Carlow, I saw one there on 15th September, and another on 23rd September. On both occasions I was riding and unprovided with a net, but the last individual I succeeded in capturing with my cap.

PERCY E. FREKE.

Entomological Notes from Poyntzpass.

LEPIDOPTERA.—In the latter part of June and earlier part of July, sugar was fairly productive, among my captures were:—*Hadena oloracea*, *H. pisi*, *H. thalassina*, *H. dentina*, *Eurois adusta*, a fine series, several very dark; *Rusina tenebrosa* quite plentiful; *Euplexia lucipara*, a nice series in beautiful condition, *Acronycta psi*, and *A. rumicis*; *Grammesia trilinea*; *Leucania comma*, and *L. lithargyria*; *Gonophora derasa*, a fair number, in good order; *Thyatira batis*, only one occurred; *Phlogophora meticulosa*, also only a single specimen; *Axylia putris*, *Noctua festiva*, *N. plecta*, *N. c-nigrum*, plentiful, *N. triangulum*, only a solitary specimen; *N. rubi*, *Miana strigilis* and *M. fasciuncula*, as usual of varied colouring; *Habrostola triplasia* with *Agrotis segetum* and *A. exclamationis*. Since the middle of July sugar has been quite useless, nothing coming to it but the ubiquitous *X. monoglypha* and *T. pronuba*, and even they not in numbers. Besides the above I met with *Crocallis elinguaria* and *Boarmia repandata* on the wing, and when driving between this and Tanderagee observed and captured *Eubolia palumbaria* in the hedge on roadside. At Loughgilly, in some marshy ground, I took *Hydrocampus nymphalis*. August was almost a blank. On the few sunny days that we had, *Pararge egeria* and *P. megera* along with *Vanessa urticae* were to be seen in my flower-garden, the first-named is remarkably abundant in my flower-garden, and seems to be about from May till the present time (Sept.). I also took *Pseudoterpua pruinata*, *Tortrix fosterana*, and a *Peronea* which seems to be *P. sponsana*. The weather is improving now (Sept.), but the nights are cold and moths despise sugar. I observed *Chrysophanus phœas*, *Vanessa atalanta*, and *Plusia gamma* flying in the bright sunshie.

COLEOPTERA.—Since my last note (p. 171 supra), I have had but little success with this Order. I made an expedition to Camlough Lake to obtain *Pelophila borealis*, and was successful in obtaining both larva and imago, but as the day turned out wet I left the lake as soon as I had obtained sufficient specimens of these and hurried back to shelter in Bessbrook. Also I have taken *Hister neglectus*, *Rhynchites minimus*, *Anthonomus pedicularius*. In turning out a pantry where meal and oats had been kept I found a specimen of *Cyphrus rostratus*; what it could have been doing in such a place I cannot imagine. In my hen-house I met with *Pristonychus terricola* which escaped the gallinaceous beak only to fall a victim to the cyanide bottle.

HYMENOPTERA.—In July I was given a female specimen of *Sirex gigas* which had flown into a gentleman's house in Newry, and caused much consternation by its ferocious appearance. *Bombus smithianus* again occurred in my lawn as well as in one of my fields. There was no great difficulty in finding their nests for as soon as one was disturbed they made a most ferocious onslaught on any person at hand. They showed a particular dislike to me, and one bee more active and cunning than the rest came up from behind and stung my hand. I found several nests, and was able to send a good example to the Science and Art Museum.

I also forwarded a specimen of the nest to Mr. E. Saunders, who submitted it to Mr. Sladen ; he remarked that the nest was similar to that of other surface builders, but that the only other nest of *B. smithianus* which he had seen, and which came from Shetland, was built on twigs of heather of moss and lichen. As regards wasps, my experience agrees with that of Mr. R. M. Barrington (*I. N.*, Sept., '97.) I have seen scarcely any, and even when Mrs. Johnson was making jam they failed to put in an appearance. Several friends have remarked to me on the absence of wasps this year. I should be disposed to blame the excessive rainfall of the first six months for this scarcity. I suspect queens and all were drowned.

W. F. JOHNSON.

MOLLUSCS.

Land and Freshwater Mollusca from Great Killary and Westport.

During a short visit with some friends to Leenane, at Easter, I collected the following species in the mountain glens north and south of Killary Harbour, which here separates Mayo from Galway, and at Aasleagh Waterfall, where the head of the fiord runs up into the Erriff Valley. The greater part of the district being mountain and bog, these little *Alts* are about the only good collecting ground I saw, but there are many of them on the steep mountain slopes of both Great and Little Killary, in the Erriff Valley, and at Delphi. Several rivers and lakes within easy reach of Leenane looked promising in better weather; during our stay, however, the heavy rain each night rendered them unworkable. Aasleagh and Delphi are in Mayo, while Dernasliggan Lodge is near Leenane, in Co. Galway :—

Vitrina pellucida, a few at Dernasliggan and Delphi. *Arion ater*, mainly var. *brunnea*, at Dernasliggan, the black form at Leenane and Delphi. *A. circumscriptus* and *A. hortensis*, Dernasliggan. *Limax maximus*, at latter and Aasleagh. *Agriolimax lavis*, a few at Dernasliggan. *A. agrestis*, common everywhere. *Amalia Sowerbyi*, at Leenane and Dernasliggan. *Hyalinia cellaria*, *H. alliaria* and var. *viridula*, *H. excavata*, *H. nitidula* and var. *Helmii* (latter fairly common) with *H. fulva*, all at Dernasliggan. *H. excavata* and var. *vitrina*, *H. nitidula*, *H. fulva*, *H. pura* var. *nitidosa*, *H. crystallina*, *H. radiatula* and var. *viridescenti-alba* with *H. nitida* also at Delphi, beside little stream running into Fin Lough. *Helix pygmaea*, common at Delphi in moss. *H. rotundata*, at Aasleagh, Dernasliggan and Delphi, but not at all plentiful; it rarely if ever is, in the west, unless on limestone. *H. rufescens*, fairly common at Dernasliggan, where one or two *H. aspersa* were also collected, both at base of old garden wall. *Cochlicopa lubrica* and *Pupa cylindracea* at Dernasliggan and Delphi, *P. anglica* at latter only with *Vertigo edentula*, and *V. substriata*, while *V. pygmaea* was collected at the former, where *Clausilia bidentata* was also

noticed on wall near the Lodge. *Ancylus fluvialis*, a few small specimens at the falls below the Blue Bridge. Mr. R. H. M'Keown, of Leenane, informs me that the Pearl Mussel, *Unio margaritifer*, is found in the Bundorragha river, when it is low in dry weather.

On way home via Westport (a limestone district) I collected the following alive in plantations in the demesne near the river, or in flood material on the banks of latter, dead:—*Hyalinia cellaria*, *H. alliaria*, *H. nitidula*, *H. crystallina*, *H. fulva*; *Helix pygmaea*, *H. rotundata*, *H. pulchella*, *H. rufescens*, latter fine large specimens, many collected in little pockets in dry corners under stones, with the spire eaten away, evidently by mice to get at the animal. *Cochlicopa lubrica*, *Pupa anglica*, *P. cylindracea*, *Vertigo pygmaea*, *Carychium minimum*, *Limnea truncatula*, fairly large specimens in little limestone quarry near falls. *Planorbis spirorbis*, *P. contortus*, *P. albus*, *Bythinia tentaculata*, *Valvata piscinalis*, *Pisidium pusillum*.

The majority of the slugs I sent as collected to Dr. Scharff, who kindly named them for me. Messrs. Adams and Standen looked over the troublesome *Zonitidae* family when we were at Ballycastle, in May, as a number were not fully grown, and required critical determination. In the case of *Hyalinia cellaria* a number of the specimens looked like the much rarer *H. Draparnaudi*, but the shells are not adult enough for certainty on this point.

R. WELCH.

BIRDS.

The Birds of Rathlin and Ballycastle District.

The brief and cursory remarks on birds, in my "Observations on the Fauna of Rathlin Island and Ballycastle District," in the July number of *The Irish Naturalist*, apply more especially to the "district"—i.e., Ballycastle and neighbourhood—and not to Rathlin Island in particular. The sentence, "The Chiffchaff and many other warblers abound" is quite correct when applied, as intended, to the "district"; and, in the sentence immediately preceding, Rathlin is specially named for certain birds we saw there, and these, although not specified, also occur in the "district." I am sorry that Mr. Warren has somewhat misinterpreted my remarks, and must apologise to him, and any others interested, for not writing more explicitly. With the exception of the Cushendun list supplied by Rev. S. A. Brenan, the few birds mentioned in my notes were seen by me and others of the party, and are not quoted from "information received." It would be very interesting to ascertain whether there has been any substantial increase in the "warbler" population of Rathlin since the "sixties." I am rather inclined to think so, but my time on the island was, unfortunately, too limited to allow of more than a glimpse of its smaller birds.

R. STANDEN.

GEOLOGY.

Post-Tertiary beds at Ballyhalbert, Co. Down.

Seven or eight years ago, when I was working at the marine post-glacial deposits of the north-east, Mr. W. Swanston told me of having observed many years before a bed apparently of the "estuarine clays," so extensively developed at Belfast, on the outer shore of the Ards peninsula, between Millisle and Ballywalter, and I searched the shore between those two places for this bed without success. Last September, when cycling along the coast of the Ards, I saw on the shore between Ballywalter and Ballyhalbert a deposit which, from Mr. Swanston's description, I at once recognised as that which he had seen; but I could devote only a few minutes to its examination. The shore here is stony. A slope of large pebbles occupies the upper portion of the shore to about half-tide level; below that level the boulder-strewn shore stretches with a very slight slope to low-water mark. The highest zone of the post-glacial beds here exposed consists of a few inches of bluish clay, running in under the steep shingle-beach some feet below high-water mark. The clay contains *Zostera*, but I saw no shells; it resembled in every respect the Lower or *Scrobicularia* clay which occurs at so many places in the north-east. Below this zone was a bed about six inches thick of solid peat. It contained numerous stumps of trees with roots spreading horizontally in all directions, and trunks and branches of trees. I measured one trunk twenty-seven feet in length. The stumps appeared to belong to the Scotch Fir, though I found no cones. The peat is only seen close to the edge of the shingle-beach. Lower down it has been worn off the top of the underlying beds, which consist of very fine pink and grey laminated clays, three feet at least in thickness. Their base is not seen. They cover an area of perhaps an acre along the beach, and it is their horizontal beds that attract the eye from the road. These clays contained no fossils so far as I could see; and they looked identical with the clays which underlie the salt-marsh behind Killough in Co. Down, and out of which bricks are now made. The exact spot where these interesting beds may be seen is one and a quarter mile north of Ballyhalbert, and just south of the spot marked "Rodden's Port" on the one-inch O.S. map.

R. LLOYD PRAEGER.

PROCEEDINGS OF IRISH SOCIETIES.

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ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Guillemot from Mr. B. N. Blood, an eagle from Dr. P. Garland, and a monkey from Mrs. St. George. Three Lion-cubs have been born in the Gardens, and six monkeys and two Lion-cubs have been bought.

10,200 persons visited the Gardens in September.

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BELFAST NATURALISTS' FIELD CLUB.

BOTANICAL SECTION — OCTOBER 16.—The winter session of the Botanical Section was inaugurated by a meeting held in the Museum on the evening of the 16th October. After tea, kindly prepared and presided over by two lady members of the Section, Mr. J. H. Davies, of Glenmore, was called on to preside. Mr. Davies stated that the first business would be to present the Chairman of the Section, Rev. C. H. Waddell, with a small token of their appreciation of his kindly interest in the work of the Section, and their sense of the value of his teaching. Kerner's *Natural History of Plants* was the volume selected, a work which presents the latest results of botanical investigation in the happiest manner. After a few genial remarks from Mr. Davies the presentation was made to Mr. Waddell, who expressed the pleasure which it gave him to receive from them such a token of their regard, and his willingness to further as much as possible their progress in botanical knowledge. The meeting concluded with suggestions for the winter work, and how botany could be best represented at the approaching Conversazione of the Club.

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DUBLIN NATURALISTS' FIELD CLUB.

SEPTEMBER 18 — A party of twenty-four took part in the annual Fungus Foray. The party took train from Harcourt-street Station, arriving at Rathdrum at 11.31. A walk of one and a half miles brought them to the entrance of the Avondale Demesne which was kindly thrown open to the Club for the day's collecting by Mr. J. H. Parnell, M.P.; a field to the right of the entrance gate proved very rich in the larger fungi, nearly thirty species being found. After a visit to the house, and lunch beside a fallen tree, the party dispersed for collecting purposes to meet at 4 o'clock for a refreshing tea at the Meeting of the Waters. The mail train for Dublin was caught at Rathdrum at 6.5. Mr. Greenwood Pim, M.A., and Dr. McWeeney took part in the excursion and undertook the identification of the fungi collected. Want of time and of a larger number of workers prevented identification of many of the smaller forms.

Amongst the fungi collected were:—*Amanita rubescens* (large and abundant), *A. phalloides*, *A. vaginata*, *A. muscaria* (one small specimen), *Lepiota procera* (very large), *Armillaria mellea*, *A. mucida* (on dead Beech), *Collybia confluens*, *C. radicata*, *Mycena galericulata*, *M. sanguinolenta* (new to the county), *Hebeloma crustuliniformis*, *Lactarius blennius*, *L. subdulcis*, *L. exsiccatus*, *Russula adusta*, *R. rubra*, *R. nigricans* (and several other species), *Boletus edulis* (very large and abundant), *B. luridus*, *B. satanas*, *B. chrysenteron*, *B. laricinus*, *Polyporus perennis*, *Peziza onotica*, *P. cinerea*, *Chlorosplenium eruginosum*, *Calloria chrysostigma*, *Ramularia urticae*, one or two undetermined Myxomycetes and a minute diserec *Nectria*, *Puccinia violæ*, *Melampsora hypericorum*, *M. betulina*, *Lycoperdon gemmatum*, *L. pyriforme*, *Ipedonium chrysospermum*. Mr. Halbert collected the following Coleoptera:—*Halyzia xiv.-punctata* (*congobata*) off Hazel, *Chætocnema hortensis* and *Baptophila rubi* by beating brambles. The handsome green Shield-bug *Pentatomia prasina* occurred in the larvæ, nymph, and imago stages by sweeping the under-growth in the woods along the bank of the Avonbeg. Homoptera (Frog-hoppers) abounded, one of the best captures being *Allygus mixtus*. Both sexes of the pretty little spider *Pachygnatha Listeri* were found; this species had been taken the previous week for the first time in Ireland by Mr. G. H. Carpenter at Clonbrock, Co. Galway.

LIMERICK NATURALISTS' FIELD CLUB.

The Limerick Field Club have recently issued the first number of their *Journal*—a well printed pamphlet of 48 pages, prefaced by some introductory matter. Four papers are published, “Limerick during the Reign of Queen Elizabeth,” by James Greene Barry (2 plates); “the Shannon Legends,” by Rev. J. F. Lynch; “Eugene O’Curry,” by Rev. T. Lee; and “Adare and some of its Ancient Buildings,” by George J. Hewson. There is no title-page or index, but a half-title bears the legend “Vol. I.”

NOTES ON AN EXPEDITION TO ROCKALL.

BY R. LLOYD PRAEGER, B.E.

[The following brief diary of ten days spent in twice visiting the oceanic islet of Rockall, may, perhaps, be of interest, as furnishing a day-by-day account of the experiences of the party sent out in June, 1896, by the Royal Irish Academy to investigate the natural history of this little-known and inaccessible rock, and of its vicinity. The official narrative of the cruise, and the scientific reports, have been recently issued by the Academy,¹ and to these the reader is referred for full information on the results of the cruise. The present notes possess, perhaps, a touch of human interest, as being taken at the time and on the spot. It only remains to add that no "editing" has been done; the notes are now printed just as they were jotted down, without alteration of any kind. Any addition required for explanation is inserted as a foot-note. The delay in the appearance of these notes is due to the fact that the official account of the expedition, which had to take precedence of any paper by a member of the Committee, came into the hands of members only last month.]

TUESDAY, JUNE 2, 10.0 A.M. ON BOARD SS. GRANUAILE.—Off Salthill, with Galway gleaming in the sunlight a couple of miles behind us. A beautiful sunny morning, with slight haze, and gentle S.E. wind. The "Granuaile" is a fine boat, 400 tons, 150 feet long, with a very pretty little saloon amidships, and three good 2-berth state-rooms—very different from the "Lord Bandon,"² where we had to sleep on the narrow hard seat that ran round the dingy cabin, with a damp pilot-coat for a pillow, and one man's heels hovering round the next man's head.

I came down from Dublin by the night mail last night, having been summoned by telegram from Green³ at 2.0 in the afternoon. He and I slept at the Railway Hotel, made some necessary purchases in Galway—spirit, oilskins, &c.—and got on board at 9.0, and were off immediately. Green, junior⁴, on board already, and Father Colgan, of Inishmore, is a passenger. The work of the expedition does not begin till

¹ *Trans. R.I.A.*, vol. xxxi., part 3, 1897.

² The steamer in which the R.I.A. dredging expeditions of 1885, 1886, and 1888 were carried out.

³ W. S. Green, M.A., F.R.G.S., H.M. Inspector of Fisheries, in charge of the Expedition.

⁴ Charles Green, amateur photographer.

we leave Killybegs on Wednesday night. At present we are still on Congested District Board business, working northward towards the rendezvous.

3.15 P.M. OFF ROUNDSTONE.—Green and Captain Quirk spent the morning checking their sextants. We cast anchor in Kilronan Bay, Aran, at 12.15. Green, jun., and I rowed Father Colgan ashore in the dinghy, and he entertained us in his neat little cottage. Then called on Mrs. O'Brien, where Fitzgerald,¹ Christen,² and I stayed during our delightful visit to Aran last July. Got a supply of coarse brown paper, in case I collect any plants. Then to the police station next door, to enquire for the tame Choughs. A constable brought us into the yard, where they have a lovely clutch of five young ones, three weeks old, which made deafening demands for food in a manner the reverse of shy. We found that all the birds they had last year, which caused us such amusement by their antics and perfect tameness, are gone—some of them to the Dublin Zoo—with the exception of Polly, an old bird who is quite a local celebrity. She makes little tours on her own account, as far even as the South Island, especially when the police go there, and makes herself at home in the cabin or engine-room of every ship that calls at Kilronan. The siren soon summoned us aboard again, where we found that a cargo of salted ling had been taken aboard, for conveyance to the curing station at Teelin. Off again, and had lunch—our first meal on board. Company—Captain Quirk, Green, sen. and jun., Mr. Shimmin, Congested District Board fishery manager, and self. Soon we passed under the old watch-tower on Golam Head, and threaded our way among the islands and rocks that lie between that and Roundstone. Wind gone altogether, and only a gentle long roll—so calm that the peasants were out in their boats by dozens, cutting weed for kelp-burning from the many sunken reefs. We passed within a couple of hundred yards of Inismaedara, and had a pretty view of the primitive little church which we visited two months ago. The serrated ridge of Urrisbeg lay eight miles to the northward, and we could see the houses of Roundstone nestling at its base. Next we passed close to the seaward face of Croaghakeela or Deer Island. It was a pretty

¹ Prof. G. F. Fitzgerald, D.Sc., F.R.S.

² Rodolphe Christen, Artist.

picture—the dark rugged line of Urrisbeg on the left, with a bright gleam on the sands of Port-na-fedog and another on Roundstone church; the grey jagged Twelve Bens in the centre, and in the right foreground the brown and green patch-work of Deer Island. Away on each hand, a long stretch of the low rocky coast of Connemara.

6.30 P.M. CLEGGAN BAY, CONNEMARA.—We passed the twin lighthouses of Slyne Head at 4.30, and got into the long roll of a glassy sea. The afternoon brightened again, and became beautifully clear. A flock of 30 Manx Shearwaters at Slyne Head, and this bird now became frequent. Now our course lay N.N.E., and at 5.15 we passed the beautifully rugged and cliff-bound High Island, and down a channel with horrid rocks just showing on either hand. Inishark and Inishbofin gave welcome shelter from the westerly swell, which was becoming heavier, and we glided into the pretty bay of Cleggan. A deep inlet, with a quay and a straggling hamlet on one side, and on the other a high steep green rocky hill, crowned by an old watch-tower. At the head of the bay the Twelve Bens form a lovely background to a long gravel-beach. There we left Mr. Shimmin on an old hulk on which fish-packing in ice was going on busily.

6.0 A.M., WEDNESDAY, JUNE 3. BROAD HAVEN, CO. MAYO.—Leaving Cleggan immediately we kept northward, out between the grand rugged cliffs of Inishturk and the lower hills of Inishbofin. Dinner luckily was served while we were still under the shelter of Bofin. The weather changed again, and the sun set red and threatening, in a sky of torn thick cloud, with a fresh N.E. breeze, and a heavy swell setting in from N.N.W. We passed Clare Island, with its grand hill rising 1,450 feet steeply from the water. Achil now loomed ahead, but it was 9.30 ere we passed its dark savage cliffs, edged with gleaming foam, with Croaghaun towering up in a grand cone 2,192 feet into the sky. Two Grampus of some sort passed us off Clare Island—large animals, with white bodies, and a large high triangular somewhat sickle-shaped black fin. At 10.30, off Black Rock light-house, I turned in. At 1.30 a.m. we finished our day's run of 150 miles, and cast anchor in the shelter of Broad Haven.

On deck this morning at 5.45. A large bay with narrow entrance; a good deal of cultivation, especially on the western

shore. High rounded hills to the eastward. Seaward, the Lights Commissioners' steamer "Tearaght" lies a quarter mile away, and behind her to the right the grand cliffs which fringe the North Mayo coast. The captain is stamping about, consigning to various unpleasant places a certain Spanish jackass that was to have been brought aboard here for conveyance to Killybegs, but which is nowhere to be seen. A dull rainy-looking morning with slight easterly breeze.

1.45 P.M. TEELIN BAY, CO. DONEGAL.—We landed a storming party at Broad Haven—the mate and two seamen, with myself as war correspondent—and with the assistance of a native contingent, captured the jackass, fastened a canvas sling on him, swam him out to the steamer in the wake of the gig, and jerked him on board with the steam winch, to his intense surprise. Then under weigh at 7.0 a.m. A heavy swell outside, and the "Granuaile" rolled badly, and breakfast, which I prudently took on deck, was a duty rather than a pleasure. Our course now lay N.E. Weather dark and rainy, with cold S.E. wind and N.W. swell—generally very uncomfortable, and we were glad when at 11.15 Slieve League was sighted on our port bow. This was the turning point of the day's fortunes. The sky slowly brightened, the sun came out, the roll lessened as we got inshore, and we passed along under the glorious precipices of Slieve League with a cloudless sky and a sparkling blue sea. Close on 2,000 feet the mountain rises in one huge precipice from the water. We passed Carrigan Head within a stone throw of its beautifully contorted rocks, and at 2.0 p.m. cast anchor in the pretty harbour of Teelin. Right above the little pier rises the landward face of Slieve League, its base dotted with cottages. The bell sounded for lunch, and we willingly trooped down. Then there was an interruption as Harvie-Brown¹ appeared and was welcomed. Barrington² was with Hart on Slieve League, it appeared, so we left him a message to follow us to Killybegs. The cargo of ling that we brought from Kilronan having been landed, we are off again.

10.0 P.M. KILLYBEGS.—I write by daylight on the bridge. Leaving Teelin an hour's run brought us into the fine harbour

¹ J. A. Harvie-Brown, F.I.S., Larbert, Stirlingshire (ornithology).

² R. M. Barrington, LL.B., F.I.S. (ornithology and botany).

of Killybegs, and we had a long afternoon to ourselves. Landed for letters and purchases. Jameson¹ waiting for us on the quay. All met at 5 o'clock tea, and we lounged luxuriously in the saloon, and our talk ran on strange islands and sea-monsters. Green, junior, and I went ashore again. A smart shower had fallen, and now the sky was all bright, the wind gone, and the air wonderfully clear. We rambled to the top of a hill south of the town, and had a lovely and extensive view—the pretty little town and harbour at our feet; east and south the whole of Donegal Bay, with all its headlands and inlets. Beyond, to the south, the range of the limestone mountains of Sligo, shining in the strong sloping sunlight, which brought out every bastion of the huge cliffs of Ben Bulben and its neighbours. Further westward, Inismurray, famous for its early christian antiquities, and far beyond, the dim outline of the Ox Mountains. Westward, the great ridge of Crownarad close at hand, with Slieve League and Croagh-muckros flanking it on the left. The knolls and meadows were gay with Iris and Spotted Orchis, and a little lake below quite yellow with Water-Lilies. The only uncommon plant I saw was *Carex lœvigata*. Coming back we found a Green-finches nest out of which the young flew when disturbed, and one of them alit on a furze-bush close by, and allowed us to stroke and handle it. After dinner we all went ashore and met Kane² at 8.30. Barrington came on board an hour later, and our party was complete. We sat late on the bridge in the twilight and perfect stillness, watching the lights of the town twinkling on the water, and discussing what the morrow may bring forth. We leave for Rockall at midnight.

FRIDAY, JUNE 5, 5.30 P.M. AT SEA.—A suspicious hiatus in my diary, but really very little to note. Yesterday morning was dark and very cold, with rain from N.E. and a nasty high sea from the westward. We were all on deck between 7 and 8. As the morning went on the weather got thicker and the sea worse, and all day we pounded and pitched along nor'-westward. Too rough for any work, but a little getting ready of trawls and dredges was done in the morning. Harvie-Brown was the only man who appeared to feel perfectly happy all day. Fulmar Petrels after the ship from early morning,

¹ H. L. Jameson, B.A. (zoology).

² W. F. de V. Kane, M.A., F.E.S.

sailing in glorious sweeps up and down and round and round, their white breasts gleaming through the mist. The little dark Stormy Petrels were there too, but did not come so close.

This morning I slipped on deck at 6.0. The sea very rough. Found Green and the mate taking a sounding with the deep-sea sounding machine. The wire stopped at 130 fathoms. In reeling it in we lost the lead and 50 f. of wire. By log we had run 236 miles, and ought to be within four miles of the rock. Weather as thick as ever, raining and blowing from E.N.E., with a high topping sea, and no chance of seeing anything at a greater distance than a mile. Sounded again at 7.0 a.m. in 80 f., and at 8.0 a.m. in 100 f. As we had apparently crossed the Rockall bank, and were going down the other side of it, we stopped, and the greater part of the day we were hove-to, working slowly eastward, and simply waiting for something to turn up, as on account of our not having had a glimpse of the sun for two days no observations could be taken, and we had no idea of our position. We tried trawling, but what with the roughness of the sea the net got foul of the propeller, and was torn to pieces, so we gave it up. Cold, wet, dark, and cheerless, with half a gale of wind and the rain and spray incessantly driving over the vessel—not a pleasant picture! At 3.30 we sighted a sail ahead, and went off in pursuit. Overhauled her about 5.0—the Ketch 885 of Lerwick. By hailing her from windward and running to leeward of her for her answer, we got the direction of the rock—W.S.W. The distance was not so satisfactorily heard, with the roaring of wind and wave. Some thought the skipper said 10 miles, some 20, some 35. "We'll run down anyway and have a look at it," said Captain Quirk; so away we went W.S.W. with the sea behind us, rising in mountains over our stern and occasionally sweeping the decks aft. I now write sitting in comparative shelter on the saloon skylight, forward of the bridge, oilskins from head to foot, as is the entire company, steady myself by my feet, jammed wide apart into the rail in front. We should be nearing the rock at last.

9.30 A.M., SATURDAY, JUNE 6.—Last night after running six miles we heaved the lead—85 fathoms. As we got under weigh again the chain of the steam steering gear broke, and we lay-to for an hour trying to repair it. No use, so we went

ahead another six miles, steering by hand, and sounded again in 70 fathoms—so we were well on the Rockall bank. Fearing to pass the rock in the dark, we hove-to for the night. Until the last moment the mate and one of the hands were in the rigging hoping to sight the rock, but no trace of it was to be seen. The rain over at last, and the sky clearing, but wind as high as ever. About 8.0 a Great Shearwater was seen, and soon half a dozen or more had been sighted; so we tumbled in to dream of getting Great Shearwaters' nests on Rockall.

This morning at 3.45 we were awakened by Green calling out "Rockall at last! The rock is close by." We rushed on deck in all sorts of costume or absence of costume. And there was Rockall at last, half a mile to windward (E.), a solitary speck of rock amid that wilderness of foam-flecked billows, shaped just like a haycock canted over to the right, with a little knob on the top. Dark brown below, black above that, whitish on the upper third. We stared our fill, and went back to bed till breakfast time. This item over, we steamed slowly to windward (E.N.E.) towards the rock, and all assembled on the bridge with cameras, glasses, and note-books, amid some excitement. The top of the rock was seen to be thick with birds, chiefly Guillemots. In the sea to the lee of the rock was an enormous flock of birds—Harvie-Brown guessed them at at least 1,000—chiefly Manx Shearwaters, with a good many Great Shearwaters among them. Also about—Guillemots, Puffins, Gannets, Kittiwakes (immature only), Fulmars, Poma-torrhine and Buffon's Skuas, and one Razorbill. The seas were roaring round the rock, often rising and enveloping it in foam two-thirds way up (close on 50 feet).

10.0 A.M.—We are now passing the rock at a distance of about 400 yards, its bearing being N.E. $\frac{1}{2}$ N. I have examined it carefully through the glass. It appears to be composed of a coarse granite. In the lower third, where it is washed clean, it is grey with reddish patches, and there are dark brown spots, like the roots of tangle. Below this, where the rock only shows in the trough of the waves, it is thickly clothed with a long bright brown hanging sea-weed, apparently a *Laminaria*. The middle portion of the rock is weathered blackish with greenish patches, apparently of some small alga. Above that, it is whitish with guano. The flat S.E. almost vertical face is pitted all over with rather large shallow pits. We

steam on round the rock. Repassing view No. 1, a little nearer, it is evident that the supposed "roots of tangle" are pittings, and that the reddish patches below are something organic, not colouring of the rock, which is grey only. The Hazlewood rock, which shows a conical point between every sea, is dark brown from growth of sea-weeds.

OUTLINE SKETCHES OF ROCKALL SHOWING JOINTING OF THE ROCK.



1. LOOKING N.E. $\frac{1}{2}$ N.



2. LOOKING W.



3. LOOKING S.E. BY S.

12.45 P.M., SUNDAY, JUNE 7.—To continue from yesterday. We steamed right round the rock, keeping as close as we safely could—about 400 yards. Numbers of Guillemots on the top, and a few gulls. About half of them rose and dropped down into the water when Barrington fired a shot. I judge the rock to be granite (in a generic sense) from its uniform colour and texture and its massive jointing. A kind of crack runs across the north-westerly face, about one-third way up from the water, and dipping southward—and here the rock looks flaky; otherwise it appears homogeneous, with few straight joints, as shown in my three outline sketches.

Having seen all we could of the rock, we fell away, and presently took a sounding a couple of miles to leeward. Depth 50 fathoms—we lost the sounder as usual. The biggest dredge was sent down. On hauling up, the dredge was gone, completely torn away, and the ropes all frayed from their contact with the rocky bottom. The only specimen obtained

was a fragment of coral, entangled in the swabs. It was clearly no use trying to dredge on such foul ground in so high a sea, so till dark we lay drifting and rolling, simply hanging on on the chance of the wind and sea going down. It was brighter in the afternoon, with patches of sunlight—the first we had since leaving port—which lit up the scene cheerily. The last we saw of Rockall was at 10.0 p.m., a black conical speck against a dark sky, on the edge of the darker water.

This morning the weather was unchanged—very dull, with a strong N.E. wind and heavy sea. We shot the Agassiz trawl at 7.0 a.m., in 150 fathoms with 400 fathoms of wire rope, 16 miles to leeward (S.W.) of the rock. Commenced heaving in at 9.0, and got it aboard at 10.0. The net was all torn to rags, and in it only one very large *Dorocidaris*, with every spine knocked off. Out of the tangles we got about half a dozen corals, half a dozen star-fishes, a small sea-urchin, and a worm with a beautiful transparent tube like a quill—that was our whole haul. This was another disappointment, and still another awaited us when Green came to tell us that coal was running out, and we would not be able to go home by St. Kilda, as we had hoped, but must make for Killybegs forthwith. So off we went S.S.E. full speed, and are now pounding along through a sea which is getting steadily heavier as the wind rises.

2.30 P.M., MONDAY, JUNE 8. OFF SLEIVE LEAGUE.—Last night cleared up a bit after all, and we had a good enough night. The evening was spent trying to catch Fulmars with a line, but unsuccessfully. This morning we awoke in a calmer sea, and at breakfast time Aranmore, off the Donegal coast, was sighted. We bore in for the huge stack of Tormore, under the high ridge of Slieveatooey. A fine morning at last; wind still fresh, N.W., but it dropped as we approached land, and the sun shone out gloriously. We passed close under the grand cliffs of Mullaghtan and Glen Head, between the low island of Rathlin O'Birne and the mainland, and are now gliding in calm blue water under Slieve League, which looks magnificent in the clear air and brilliant sunshine. Being too late to catch train to Dublin to-night, we are running south to have a couple of hours on Inismurray, preparatory to spending the night at Killybegs. A sad accident has just

happened in the saloon. The steward, being in calm water at last, put his best foot foremost, and laid the luncheon table in grand style, with a clean cloth and a bouquet of flowers as a centre-piece, and for the first time since leaving port, fiddles were discarded. But a little farewell lurch from the ocean made havoc of all his efforts, and stew, wine, bread, potatoes, jam, pepper, crockery, and pickles all crashed down in one hideous mess on the floor!

9.0 P.M. KILLYBEGS.—In port once again, just five days, less three hours, since we left. This afternoon we steamed in brilliant sunlight across Donegal Bay, and landed on Bomore, a low rock of Carboniferous sandstone off Inismurray. We had hoped to see seals, but all that the rock yielded was Cormorants and Turnstones, and a Common Gull on her nets with one egg, on a low cliff overhanging the water—a very peculiar situation, which Green promptly photographed and sketched. Then we landed on Inismurray, and had two hours there, which I spent listing the plants of the island.¹ Then steamed again across Donegal Bay in the evening light, and have just now cast anchor off Killybegs, on a night as clear and calm as when we left it. The evening has been spent in discussing the possibility of another dash to Rockall, and it has been decided that if we can have the "Granuaile," and the weather looks satisfactory, we shall get notice on Thursday next for a start on Saturday.

10.0 A.M., SUNDAY, JUNE 14. AT SEA.—Here we are again. Since our return on Tuesday last Mr. Green arranged with the London Meteorological Office for daily weather-telegrams from Tory and Shetland. These were favourable, and so on Friday afternoon we were all summoned for a second attempt to explore Rockall. Every one delighted. The whole ship's company, from the captain to the cook's boy, as well as ourselves, were bitterly disappointed over our failure to land, and all were eager for another try. Kane has not been able to rejoin us, and Green, jun., is absent; otherwise our party—now five in number—is the same as before. We left Dublin yesterday morning, purchased some necessaries in Strabane, and reached Killybegs at 8.30. Harvie-Brown, who crossed from Glasgow to Londonderry last night, having had just

¹ For a notice of the plants observed, see *I.N.* for July, 1895, pp. 177-8.

forty-eight hours at home, was on the platform to meet us, with the captain and four sailors. We left Killybegs at 11.0 p.m.—a lovely evening. There was thick fog during the night, and a bit of a roll off Rathlin O'Birne. This morning is cloudy, but clear on the water, and delightfully calm, with just a slight roll coming from the north, and a gentle S.E. wind ; and we are all in high hopes of a successful landing to-morrow morning. The first Fulmar was welcomed at breakfast time.

10.0 P.M.—All day we have bowled along N.N.W. in a calm sea. The time has been fully occupied in getting the harpoon gun, sounding machine, trawls and dredges ready, and in making good damage done to gear in the rough weather last week. During the afternoon the sky cleared, and we had a couple of hours of glorious sunshine, but now a fresh S.W. breeze has sprung up, under which the surface of the ocean is already beginning to move, and the sky is dark and rainy. We feel very anxious about our prospects to-morrow. Great Shearwaters have been about all afternoon and evening.

5.30 A.M., MONDAY, JUNE 15.—All awakened by Green at 4.45—the rock in sight ; and all soon on deck. A very nasty morning, with high wind and bad sea from W.S.W. The sea is not, however, so bad as the last day we were at the rock, but still it is doubtful if landing could be attempted. We crept up and passed the rock at half a cable's length (100 yards). At this distance it looks distinctly gneissose at one spot low down on the right hand side of the great S.E. face, and we can see that the surface is pitted almost everywhere. Puffins are sitting in some of the pits on the eastern side. Guillemots in numbers, and some Kittiwakes and Gannets, are sitting on the rock as before. The chief joint-plane of the islet dips about 15° E.S.E., and the two sides of the rock at its most “toppled over” view, are pretty much perpendicular to this. The centre of Rockall bears S.S.W. from the centre of the Hazlewood Rock. N.E. by N. is the exact strike of the almost vertical flat south-easterly face.

5.0 P.M.—The wind and sea increased, rendering all thought of effecting a landing out of the question, and we hung round the rock, getting some more sketches and photographs. We crept in again to within a half cable's length, and in spite of rain, spray, and roll, Green got some good shots with his half-plate camera. But even at this distance, so great was the back-

wash of the waves that the steamer's stern was sucked in towards the rock, and the captain had to put on full speed ahead to get her clear. We tried dredging, but as usual the dredge was torn clean away—the ground around the rock must be very foul. However, we caught a fine Cole-fish on a "murderer," a welcome addition to our larder, and then steamed away 10 miles, to try to find smooth ground to trawl in. Sounded at 2.0 p.m. in 100 fathoms 10 miles south of Rockall, and sent down the Agassiz trawl. It came on deck at 4.0, with a lot of very old broken shells, and a few fresh valves, but no living specimens. Among them were several examples, including a fine fresh valve, of a very fine *Pecten* 4 inches across, and in shape and sculpture like a young *P. usio*¹; also *Terebratula caput-serpentis*, *Crania anomala*, *Pecten tigrinus*, *Lima Loscombi*, *Mytilus modiolus*, *Venus casina*, *V. fasciata*, *Mya*, *Saxicava*, *Buccinum*. Also a number of small pebbles, chiefly black, and apparently composed of basalt, but also one of quartz, and another which bears a marvellous resemblance to the riebeckite-granophyre of Ailsa Craig.² A few star-fishes completed the haul. A second haul is just now completed in 110 fathoms 14 miles south of Rockall, and the trawl is coming aboard.

8.0 A.M., TUESDAY, JUNE 16.—Our second haul yesterday yielded a very small quantity of material, but a good variety—starfishes, sponges, corals, polyzoons, &c.; several *Scaphander* alive, and *Saxicava* burrowing in dead coral. The sky cleared in the evening and the welcome sun came out. The wind slackened, and the sea began to go down. After dinner we again steamed up to the rock. Heavy seas breaking on it continuously. Harvie-Brown shot a Great Shearwater for dissection in quest of ova, and also one of the immature Kittiwakes that haunt the rock. The dinghy was lowered without mishap, and Green and one of the men picked up the birds; they got safely on board again with nothing worse than a wetting from spray. We remained near the rock under easy steam all night, in hopes that the weather would at the last moment permit of an attempt to land. This morning we were on deck at 6.0. A gloriously bright morning, but with a strong S.W. wind, and a most outrageous sea. A lot of Great

¹ *P. islandicus*.

² This pebble was lost during the working out of the materials.

and Manx Shearwaters about. We wanted to lower the gig, with the harpoon gun on board, and make a final attempt to land by throwing a line over the rock, but the captain would not give his permission, on account of the state of the sea. The dinghy was lowered, with Green and two men, and they went as near the rock as they dared, but even on the lee side they could not approach within twenty yards, on account of the back-wash of the heavy seas. They failed likewise in procuring any seaweeds from Rockall or Hazlewood, and came aboard again with nothing but a good deal of salt water.

1.0 P.M.—Immediately after breakfast we put down the Agassiz trawl in 120 fathoms 16 miles east of Rockall, and while it was down had great fishing for Fulmars over the stern, with baited hooks and twine. But the birds were quite too clever for us, taking the bait off the hooks repeatedly without once being caught. At 10 p.m. we got the trawl aboard, and found that we had at last made a good haul. The pocket was full of the great pink sea-slug *Holothuria tremula*, and of two sponges—a large cup-shaped one, and a cylindrical one. There was a large variety of other things, including *Dorocidaris*, *Spatangus purpureus*, and other echinoids, *Anomia*, *Buccinum*, *Fusus*,¹ *Scaphander*, and a pretty little transparent *Pecten*² among molluscs, *Crania* and numerous Polyzoa on a couple of large black stones, and many other things. As soon as the trawl was aboard (11.30) we started full speed eastward for St. Kilda, with a rising wind singing in the rigging, and Jameson and I are now busy on the forecastle bottling and labelling the specimens.

1.0 P.M., WEDNESDAY, JUNE 17. ST. KILDA.—All day yesterday we bowled along with a merry S.W. wind behind us, and a sparkling heaving blue sea. We were tired enough after our morning's work, and sprawled about the deck luxuriously in the sunshine, spinning yarns, and watching for birds. A large cetacean, probably a Rorqual, was seen in the evening, but did not come near the ship. We had a gorgeous sunset, and at 9.30—still broad daylight in these northern latitudes—I turned in, but was speedily roused by a commotion on deck,

¹ *Buccinopsis Dalei*.

² *P. similis*.

and turned out in a robe-de-nuit and an oilskin to find several Dolphins playing round the bows of the ship. It was grand to watch them away down in the blue water, dashing to and fro under the ship's nose, now plunging deep, now turning over and showing their white under-side, now rising and cutting the surface with a whiz with their sharp dorsal fin. Great efforts were made to harpoon one, but without result.

This morning I came on deck at 6.0, roused by the unaccustomed absence of motion, to find the "Granuaile" lying at anchor in the Bay at St. Kilda.

[My notes of our brief visit to St. Kilda are omitted here; a short notice of some of the plants I observed will be found in *Annals of Scottish Nat. Hist.* for October, 1896.]

We weighed anchor again at 1.0, and are now slipping out of the bay and setting our course south for Lough Foyle. The mist hangs so low on the cliffs that it is no use going round the island—a great disappointment, as we had been eagerly looking forward to seeing the glorious cliff-scenery of this group.

9.30 P.M. BERNERA ANCHORAGE, BARRA.—A sudden interruption of our homeward voyage. On leaving St. Kilda we found a heavy ground swell from W. setting in, which steadily got heavier. The wind shifted back and forward, the western sky darkened, and it was evident that a blow was coming on. It was fresh when we went down to dinner at 7.0, and when we came up again it was blowing a whole gale, and increasing every minute, and the sea was high and breaking, and flying over our decks. The steamer rolled very heavily in the beam sea.

At 8.30 we sighted Barra Head, the southerly extremity of the Hebrides, looming dimly through the mist and rain; north of it high hills and great headlands. Our course was altered, and we stood in towards the land with a wild following sea, and passed under Barra lighthouse, standing solitary on the summit of an immense basaltic cliff 630 feet high. Then our helm was put hard to port, and we slid through calmer water, and have just cast anchor in Bernera anchorage, between the islands of Bernera and Mingulay, with a tidal rock just in front to break the force of the western sea as it comes through the narrow channel.

8.30 A.M., THURSDAY, JULY 18. AT SEA.—The storm was of short duration, though severe while it lasted. Before 4.0 a.m. I was awakened by the crashing of the seas against her plates (our berths were all on the weather side), and the hissing thump of the water as it crashed down on the deck overhead—we had put to sea again. On deck at 7.0. A bright morning, with great green seas shimmering and flashing in the sunlight. No land in sight. A solitary Fulmar keeps us company, and a crowd of Common Gulls are clamouring at our stern.

2.30 P.M., OFF INISHOWEN HEAD.—We sighted the Irish coast at 10.0, and slowly it rose into view. Raghtin first, with Dunaff Head at its western end. Then Slieve Snaght, and away to the west the long ridge of Muckish, and Horn Head with its huge cliff. Next the long ridges behind Malin Head, and further east the dim line of the Inishowen headlands. Then the low outline of Inistrahull, and Malin Head. The Fulmars followed us to within 20 miles of shore, and the Stormy Petrels were much further in. A heavy shower hid our view of Inistrahull as we passed, and when we came on deck after lunch we were gliding along the high picturesque Inishowen coast, beautifully bright after the rain. Ahead is the distant coast of Co. Derry; further eastward lies Knocklayd, and we can discern the bold cliff of Fair Head, and the mountains of Cantire.

5.30 P.M. OFF DERRY QUAYS.—We had a fast and pleasant run along the Inishowen coast and up Lough Foyle, past the grand ruin of Greencastle, and Moville, and the sharp bend of Culmore, and sat down in the saloon to a committee meeting, when the distribution of specimens for determination, and the drawing up of our preliminary and general report, were considered. Now we are alongside the quay at Londonderry. I am hurrying off to catch the 6.0 p.m. train to Belfast. Green, Barrington, and Jameson follow by the 9.30 p.m. to Dublin; Harvie-Brown crosses by to-night's boat to Glasgow; and so our little party breaks up. The two trips have furnished one of the most interesting and pleasantest times I have ever had, despite the continuance of atrocious weather, and the failure to effect the particular object of the expedition—a landing on Rockall.

ADDITIONS TO THE LIST OF IRISH ACULEATE
HYMENOPTERA DURING 1897.

BY PERCY E. FREKE AND H. K. GORE CUTHBERT.

Formica fusca cunicularia (Latr.)—Ballybunion, Co. Kerry—Cuthbert.

Crabro aphidum (Lep.)—Borris, Co. Carlow—Freke.

Odynerus sinuatus (Fab.)—Borris, Co. Carlow—Freke.

Nomada Jacobææ (Panz.)—Ballybunion, Co. Kerry—Cuthbert.

Besides these, some insects were taken which were desiderata though not new to our fauna.

Sialis exaltatus (Fab.)—Has hitherto remained on our list *cf.* Dr. Foot (*Proc. Dublin Nat. Hist. Soc.*) without locality. It has been taken this season at Tramore, Co. Waterford, by Freke; and at Ballybunion, by Cuthbert.

Andrena analis (Panz.)—Is reported as occurring in Ireland, without locality, by Smith (*Cat. Brit. Bees.*, 1871, p. 65). It has been taken at Ballybunion, by Cuthbert.

NOTES.

BOTANY.

PHANEROGAMS.

JUNE AND DECEMBER.

On October 24th, riding to Rathdrum, I noticed a Holly-bush by the roadside at Glenealy covered with berries, already bright scarlet, and festooned with a copious garland of Honeysuckle in full blossom, and delightfully fragrant—a pretty combination of mid-summer and mid-winter.

R. LLOYD PRAEGER.

ZOOLOGY.

MOLLUSCS.

Helix ericetorum, MÜLL., REVERSED.

In view of the extreme rarity of this monstrosity, it may be worth while to record its occurrence—possibly for the first time—in Ireland. The example belongs to the var. *alba*, and was sent me in October from Bundoran. It is, however, recent, though a dead shell, and not semi-fossil like the sinistral *H. nemoralis* of that locality.

B. TOMLIN.

ARTHROPODS.

Battle between Wasp and Spider.

It must be thirty years ago—and I suppose it was because the house-maid did not do her duty—but at any rate a big spider—the largest of our spiders, I think, with a handsomely marked abdomen—made its web right across the plate-glass panel of the inside door of our entrance hall at Fassaroe. She was a really handsome specimen, and we used to feed her with house flies which were caught instantly, big blue-bottles too were made short work of. This was such a voracious spider that it occurred to me one day to catch a live wasp and throw it into the web.

The wasp was unhurt, and the spider was as usual at “attention” in the centre of the web. The wasp hit the upper outside margin, and I will never forget what happened; it buzzed furiously, and one or two threads broke. The spider was agitated, but appeared instantly to realise the situation. She made a dart about an inch sideways, then took a rapid sweep past the wasp, going within an inch and threw out with a jerk a sort of lasso which caught the wasp by the leg or wing (I forgot which).

The wasp buzzed and tore and bit the web frantically; the spider returned to the centre, the web again broke, and the wasp was nearly free, but once more the great spider took another sweep past the wasp, going almost within half-an-inch, and threw out another lasso which bothered the wasp greatly, and he fell against one of the mainstays or hawsers which supported the whole fabric.

The spider with body erect appeared to be listening or watching, then with a bound she went right round the wasp without touching it and tangled both wings. For a moment the buzzing ceased, and this symptom of defeat caused the spider to rush directly at the wasp and to tangle him still more. Threads seemed now to be made as if by magic and in less than a minute the wasp was rolled up like a mummy, partly by the spider going round it, but chiefly owing to a rotatory motion given to the wasp by the spider's legs. The spider did not cease until the covering was so thick that the wasp resembled a whitish-grey chrysalis, for not a particle of the original insect could be seen.

The encounter was most exciting, and though it ended in the defeat, and capture of the wasp, I don't think this would have been possible save for the apparent power possessed by the spider of lassoing a dangerous enemy by shooting out its glutinous threads by a sort of centrifugal jerk when sweeping past its victim.

A day or two after I tried a bumble bee in the web, but it was too heavy, and, the meshes giving way, it escaped.

This note is written because it would appear from the *Zoologist* of the current month that the wasp *v.* spider controversy is not yet settled.

RICHARD M. BARRINGTON.

PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

The Council of the Society desire to express their deep regret at the death of the Rev. S. Haughton, F.R.S., in whom Ireland has lost an illustrious scholar and a distinguished zoologist. They would wish also to put on record their sense of the inestimable services which he rendered to the Society, during the long period in which he acted as its Honorary Secretary and afterwards as its President, and to give expression to the deep sympathy which they feel with Dr. Wm. S. Haughton and Miss Haughton in their heavy bereavement.

Recent gifts include a male Yak from the Hon. A. S. G. Canning, a Barn Owl from Dr. Patton, and a St. Kilda Sheep from Mrs. Dames Longworth. A female Japanese Ape with baby, and an Angolan Vulture have been bought.

9,630 persons visited the Gardens in October.

DUBLIN MICROSCOPICAL CLUB.

OCTOBER 21.—The Club met at the house of Mr. W. N. Allen, who proposed on behalf of Dr. W. Frazer the following resolution, which was seconded by Mr. A. Andrews, and passed unanimously:—

“ The Members of the Dublin Microscopical Club desire to place on record their deep sense of the loss they, in common with all who take an interest in Irish Natural History, have sustained by the death of Mr. William Archer, F.R.S. He was one of the original founders of the Club, and for upwards of forty years acted as its Hon. Sec. He was a constant contributor at the monthly meetings, as well as the author of many important memoirs in the *Proceedings of the Club*.”

Mr. ALLEN showed drawings of Corallinaceæ.

Mr. DAVID MCARDLE exhibited specimens of an interesting liverwort, *Lejeunea Holtii*, Spruce, which he recently collected at Torc Waterfall, Killarney. This rare Hepatic was first found by Mr. Holt, of Manchester, in the same locality in 1885; therefore its rediscovery last month by Mr. McArdle when collecting for the Flora and Fauna Committee of the Royal Irish Academy is interesting, as it has not been found amongst the numerous collections of Hepaticæ made by him in various parts of Ireland. It differs from every European *Lejeunea* in the female flowers being borne on very short branchlets which normally put forth no sub-floral innovations such as exists in all our other species. In size it resembles *S. flava*, Swartz, or luxuriant *L. serpyllifolia*, Libert, but differs from both by the pale reddish tinge of the foliage, which is most remarkable in the leaves of the lower half; this character was well shown in the specimens under the microscope. The large pear-shaped perianth, sharply keeled, so as to appear five-winged, is also a unique character (*Journal of Botany*, vol. 25, p. 35, 1887, excellent description and

figure). Dr. Spruce writes: "of all South American *Lejeunea*, gathered by myself or known to me from other regions, *L. Holtii* seems to stand nearest a small group of which I have described three species under the name *Potamolejeunea*. These all grow in North Brazil, almost on the actual equator."

Rev. H. W. LETT sent for exhibition specimens of *Fossumbronia cristata*, This hepatic, which does not appear to have been recorded from Ireland, was found by him in October, 1890, growing abundantly on the shore of Lough Bricland, Co. Down, and was mentioned in a paper he read shortly afterwards before the Belfast Naturalists' Field Club, which, however, was not published in their *Proceedings*. The habitat was a bed or flat bank of a whitish stiff clay, which is usually covered by water, but had that season been dry for several months. The tufts were from half an inch to two inches in diameter, in the form of little rosettes of a vivid green colour. The individual plants were densely tufted and taller than *F. pusilla*, which abounds in a wet autumn in all the clover-fields in the neighbourhood. The spores are covered with ridges or crests.

Mr. ALLAN SWAN sent for exhibition *Olpidiopsis Saprolegnia* (Cornu), one of the Chytridiaceæ group of aquatic Phycomycetes, cultivated from *Spirogyra* collected at the Bofinna lake, in the mountains near Bantry. This plant is of special interest since its life-history was worked out by Cornu. The exhibitor is not aware of it having been previously recorded in Ireland. It lives as a parasite which develops in the filaments of the Saprolegniaceæ, living on the protoplasm of its host. The filaments in which it grows assumes a short clavate shape, and the zoosporangia of the parasite are produced in their enlarged extremities. These zoosporangia are generally oval, but vary somewhat in shape and greatly in size, while their number—as was shown in photographs—may mount to over a dozen, or, as is more general, be restricted to a single one of greater dimensions. The zoospores which are contained, to the number of several hundreds, in each sporangium, are active swimmers, with a single cilium, and unusually small ($\frac{1}{250}$ of a millemètre—say $\frac{1}{8000}$ of an inch). Their movement begins before they escape into the surrounding liquid, an outgrowing tube from the zoosporangium serving for their liberation. They are said to have the power of penetrating the walls of the plants in which they live as parasites. Some of these zoospores are, however, liberated into the empty filament of their host, and, with their active movement, can from there easily reach its mycelia, whence they may be able to penetrate to other growing filaments. In the photographs were to be seen zoosporangia in several stages of maturity. Many with their zoospores ready to escape, others empty, after the liberation of the zoospores; the outgrowing tube could also be seen through which they escape from the sporangium. One example of the second mode of reproduction—by means of resting spores which have short outgrowing spines—was also shown.

DUBLIN NATURALISTS' FIELD CLUB.

OCTOBER 12.—The winter session was opened with the usual conversazione, in the Royal Irish Academy Rooms, Dawson-street, which was largely attended by members and their friends. The Belfast Club sent Messrs. J. St. J. Phillips and R. Welch as their representatives, while Cork and Limerick were represented by Professor Hartog and Mr. F. Neale.

The President (Professor Cole, F.G.S.), after a few words of welcome, showed a fine series of lantern slides, illustrating the Fjords and Isles of Western Scotland, Skye itself being specially dwelt upon. Mr. R. Lloyd Praeger, B.A., Vice-President, followed with an equally fine series of slides, made by Mr. R. Welch, illustrating Ballycastle and district (Co. Antrim), visited in July last by the Irish Field Club Union. Professor Haddon, D.Sc., showed a very complete series of slides illustrating adze-making in the Andaman Islands. Mr. F. W. Moore, M.R.I.A., demonstrated a set of slides prepared by Mr. Greenwood Pim, M.A. (who was unable to be present), illustrating the Glasnevin Arizona *Cacti*, &c.; Rev. W. S. Green, F.R.G.S., also sent slides relating to fishery work, &c. Dr. Hurst had charge of the lantern. The natural history exhibits were numerous and interesting, and included the following:—F. W. Burbidge, F.L.S., *Azolla* in fruit, and a series of fragrant plants; G. H. Carpenter, B.Sc., sample insect-cases for the new Museum collection of Irish animals; Rev. M. H. Close, M.A., F.G.S., his map of the glacial drumlins, or parallel ridges of boulder-clay of Ireland; H. K. G. Cuthbert, Treasurer, a handful of shingle from Ballybunion, Co. Kerry; G. P. Farran, some land and fresh-water shells from Westmeath and Sligo; A. H. Foord, Ph.D., F.G.S., Carboniferous fossils from Malahide and Hook Head; Mrs. W. S. Green, fossil corals, Clew Bay islands; Miss R. Hensman and T. Johnson, D.Sc., Hon. Secretary, some Irish Corallinaceæ; A. V. Jennings, F.L.S., F.G.S., two table cases of mosses and liverworts for the Botanical Teaching Collections in the Royal College of Science; D. M'Ardle, *Anthoceros* and other rare liverworts, with microscopic illustrations; F. W. Moore, M.R.I.A., a much-admired group of insectivorous and other plants, Royal Botanic Gardens, Glasnevin; A. R. Nichols, B.A., some rare deep-water Echinoderms, &c., from the West Coast of Ireland; J. St. J. Phillips and J. R. Bell, B.N.F.C., Opals and other objects of geological interest; R. Lloyd Praeger, B.A., B.E., Vice-President, characteristic plants of Co. Antrim, visited by the Club on the Ballycastle excursion; J. G. Robertson, some natural history objects; Mrs. J. T. Tatlow, marine shells from Woodstown, Co. Waterford; H. J. Seymour, specimens of Irish rocks; Miss L. Shackleton, a series of beautiful water-colour drawings of flowering plants, prepared in part for the Botanical Collection, Science and Art Museum; R. Welch, B.N.F.C., Irish land and freshwater shells (Ballycastle, &c.) Thanks were expressed to the ladies of the Committee (Mrs. J. T. Tatlow, Misses R. Hensman, and Singleton) and to Mrs. Grenville Cole for their excellent management of the refreshments dispensed during the meeting.



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